

Introduction

1.1. It has been increasingly recognised in recent years that a concentration of attention upon overall problems of the national economy, which is right and proper in itself, may lead to the neglect of certain attractive possibilities for increasing welfare. This has been officially recognised in the establishment of the development areas in the United Kingdom. Similarly, the concept of the development area may lead to the neglect of particular areas whether within the development areas or elsewhere.

1.2. The argument which has been most frequently offered for concentration on the development area has been in terms of differences in the degree of unemployment in different parts of the country. A Keynesian policy of national 'full employment' may leave pockets of 'less than full employment' scattered in various places. Any measures which will tend to increase employment in such areas of high unemployment without creating excess pressure of demand in the more favoured areas of the country are likely to be an attractive ingredient of economic policy. This will be true whether discrimination in favour of high unemployment areas takes the form of a differential sales or labour tax, of investment grants, or of public works expenditure.

1.3. High unemployment is not however the only case for discrimination in favour of particular regions. There are at least three other cases in which such discrimination will appear attractive. Briefly these cases turn on low participation rates, high emigration rates, and opportunities for a rapid rise in productivity. We may consider these cases in turn.

1.4. Low participation rates tend to be associated with high unemployment. This association is not by any means universal, however. In general participation rates depend to a considerable degree on the availability of suitable female employment. Some economic advantage may be obtained by introducing female employing firms into an area where female employment opportunities are scarce.

1.5. A large net outflow of population from a region is often associated with high unemployment and low participation rates. But sometimes one may observe high net emigration rates in the absence of these factors. When this occurs there may be an economic loss in terms of extra housing, roads, services, etc., required in the population receiving areas. There is also direct economic loss through the cost of moving the period of adjustment to a new job, and the avoidable costs to those remaining.

1.6. There is a substantial economic case for moving economic resources to those areas where productivity is most easily raised. The problem is to discover the areas having such characteristics. The hypothesis may be proposed that areas of low productivity are also areas in which the capital formation required to raise productivity by any particular amount is low. This is partly because areas of low productivity are likely to be areas with large numbers of workers employed in low wage industries. New capital formation may take the form of the introduction of new high wage employment. Or it may take the form of increased employment in service industries resulting in a rise in wages in such industries, and increases in the output coming from such industries from the greater utilisation of excess capacity.

1.7. This hypothesis is as yet untested on a regional basis. But there is some evidence that a rather similar proposition holds for productivity growth among countries which have reached a high degree of economic development. There is however no suggestion that the case with which productivity can be raised is proportional to the level of productivity; each case must therefore be examined on its merits. The whole matter is still very much open to argument but this hypothesis does offer reasonable grounds on which to base further research.

1.8. It may be useful to sketch in barest outline the form which a fully developed economic model of a regional plan might take. This may prove helpful in evaluating the admittedly modest achievements of the present study. It may also give some guidance on possible lines of future development.

1.9. The basic objective of such a model is the presentation of all costs and benefits of any given plan which have a quantifiable economic measure. Typically current practice tends to restrict these costs and benefits to those which are measured in the market. Typically, moreover, the planning exercise deals only with a proportion of total costs and benefits, and excludes, for example, the effects of development on costs and revenues of an external railway system. The object of a planning exercise in the first instance is to rank alternative plans on the basis of an expanded concept of costs and benefits. It is not necessarily the case that selection of the plan having the greatest cost-benefit balance is indicated. There are also aesthetic considerations which are exceedingly difficult to quantify but may be of great importance. It will be in order for the public authorities to consider how much they are prepared to sacrifice in resources or

benefits to achieve any particular aesthetic effect.

1.10. We shall consider some of the elements of this curious statement in greater detail below. But special attention should be given to the problem of time discounting. It has sometimes happened that planners have given too little attention to this aspect of their work. As an example the desire to incorporate flexibility in physical plans has sometimes implied large expenditures at an early stage of the plan. Such expenditure may in some cases not be fully justified by future gains if proper weight is given to uncertainty and interest factors.

1.11. Turning now to a more detailed evaluation of the planning process, we may enumerate certain costs and benefits not always given proper weight in current practice. Relevant costs include

- (1) capital outlay on streets, houses, factories etc. plus proper time discounting for these.
- (2) costs of providing added transport facilities, such as extra trains, extra maintenance on roads.
- (3) cost of extra labour required to man new factories, shops and offices attracted from outside the region.

The benefits to be considered include

- (1) extra output from reduction of unemployment, increase in participation rates and productivity gain.
- (2) net decrease in value of time spent in travel to work, or undesired travel to leisure pursuits.
- (3) value of improved amenity, and increased range of educational or industrial opportunity. (Amenity value is distinguished from aesthetic value. The former would ideally involve an assessment of the earning power of parks, playgrounds, etc. if in private hands).

1.12. If we accept the view that the achievement of rapid productivity gain is an important aim of regional policy, then we must endeavour to shape our policies so as to encourage the movement of new industry to the region, and to encourage the re-equipment of existing industry in the region. As noted before, there are a wide variety of measures which might be adopted to achieve this end. In practice, however, present government policy leaves rather limited instruments in the hands of an agency desirous of regional regeneration for any special geographical area below the level of the development areas as a whole. In practice these measures are at present confined to the provision of infrastructure, the provision of government services, the location of government activities, (industrial and administrative), the provision of subsidised factory space, and the provision of subsidised housing. It appears probable that a broader range of instruments would improve the efficiency of regional policy, but that is not the point at issue at the moment. The urgent practical question is how the available instruments of policy can be best utilised.

1.13. It would be tempting, but misleading, to assume that the sole aims of regional policy should be the deployment of available instruments of policy so as to achieve the maximum inflow of new industry into a region for any given level of government expenditure on the region. To take such a view would among other things be to ignore those elements of cost which were borne by residents of the region rather than the government. It would also ignore possibilities of expansion and strengthening of existing industry. And it would ignore those elements of cost which were thrown on to other regions. But while there is thus no substitute for a full economic analysis of the implications of a regional growth policy, it must be said that the attraction of new industry is likely to be a central part of such a policy.

1.14. One method of providing economic stimulus for a region is to arrange for a growth in its housing stock, accompanied by population growth. There is some reason to feel however that housing policy alone is rather unlikely to achieve such an aim. Most of the evidence available seems to suggest that employment opportunities provide the driving power behind population movements, and that the availability of housing acts largely as a constraint upon this process. Indeed there is considerable evidence from various parts of the country that people will put up with strikingly low housing standards in order to take advantage of attractive employment opportunities.

1.15. It has been argued, nevertheless, that the existence of available housing will have an effect in inducing new firms to enter a region. This is said to be partly because the existence of ample housing makes it easier for a firm to persuade its key employees to move to a new location. Since the existence of vacant housing available at low rents acts like a subsidy to wages such a result is hardly surprising. It appears, on this argument, that a rapid economic regeneration of an area involves the injection of at least some new housing.

1.16. The need for a substantial increase in population as a means to economic regeneration requires separate examination. While there is no doubt that population growth will itself provide an economic stimulus of great importance, and while there is also no doubt that it provides an atmosphere in which new industry sees prospects of attracting labour more easily to itself, it is open to question whether it is actually essential to economic expansion. While there are numerous examples of rapid introduction of new industry in regions where total population has grown little, many of these have been associated with the running down of some existing industry. Good examples have been provided in recent years by the run down of the coal industry. It would appear that this question offers an important field for future quantitative investigation.

1.17. If one decides upon a process of economic expansion based partly upon population growth the issue arises of whether population

growth should be concentrated in some new settlement, spread among existing settlements, or added to a single established settlement. There is a closely related issue of whether infrastructure investment should be directed to increasing the amenity and industrial attractiveness of a single settlement or spread more widely. This is sometimes described as the question of whether expansion should be concentrated upon a few 'growth points.'

1.18. This issue is far more complex than has sometimes been believed. It is questionable whether there is a single set of answers which will fit all circumstances, and it is certain that no firm and convincing answers can be obtained without a great deal more empirical research than has so far been undertaken.

1.19. It may be helpful, however, to sketch out here some of the factors which have to be considered in deciding this issue. The first of these is the apparent preference of industry for locating in or near centres already possessing substantial population. This tendency underlies the striking phenomenon of growing urbanisation which has characterised Western society in such a marked degree since the beginning of the 19th century. In recent years this tendency appears to have, if anything, increased in intensity, and the growth of the larger cities has begun to be accompanied by an actual decline in the population of some smaller towns.

1.20. One possible approach to this problem is to attempt to raise declining towns to a size at which they would become viable economically. Such a policy would, if generalised, prove rather difficult, since the number of smaller towns is quite large. An alternative would be to found a new centre, or expand an old centre, in each geographical region, to a viable size, in the expectation that it would provide employment opportunities for those in neighbouring towns.

1.21. While considerations of 'viable size' thus appear to suggest concentration in a small number of places, and while this argument is supported by the economies—especially in terms of infrastructure—which might flow from concentration—there are also considerations on the other side. In the first place the movement of industry to available labour is certainly more convenient to the workers and probably more effective, than having workers travel to work. There are, secondly, problems of congestion which arise when population and industry are concentrated in a narrow area. Problems of congestion are, of course, particularly acute in the expansion of existing centres of population, and this has suggested to some that the appropriate response would be to concentrate population and industrial growth upon entirely new centres. But while this idea also has obvious attractions in terms of environment and amenity it would appear to involve substantial expense in terms of duplication of some infrastructure and service elements and in terms of the teething troubles of industry.

1.21A. It is important to notice, too, that, while a new growth point may attract industry to

an area which might not otherwise have come to that area, it is also likely to divert firms which would have in any case settled in the area from establishing themselves in existing communities. There are some signs that this principle has operated in a striking way in influencing the course of development in Scotland as a whole over the past decade or so. It must be carefully considered whether this phenomenon might not arise on the smaller economic stage provided by a region like the Borders. There is usually some substantial economic advantage in allowing existing economic communities at least some scope for further growth, and this must be given due weight in any planning exercise.

1.22. There is considerable ambiguity in the notion of a viable size of town. Some quite small towns prove viable because of the possession of an intrinsic locational advantage—a mining town would be the best example. Others may prove viable through their provision of a specialised industrial environment providing advantages to firms in a particular trade or industry. The advantages of specialisation are no doubt less now than they were in the past because of the improvement of transportation. They are moreover purchased at the expense of vulnerability to cyclical fluctuation and structural change greater than has recently seemed widely acceptable. There are moreover limitations to the variety of job opportunities which can be offered in a specialised community. In spite of these points specialised communities do offer some attractive possibilities especially if specialisation lies in the direction of research and technical advance.

1.23. 'Viability' is moreover a question of transportation almost as much as of size. A smaller town may prove attractive to industry as long as it has easy access to the commercial advantages of some large city. Indeed some would say that this is the basic explanation of the success of the satellite new towns of the post war period.

1.24. The utilisation of improved transport facilities as a means of reducing the economic disadvantages of a town possessing a small population is one of the points most deserving of further study in the whole field of regional planning. Transportation facilities may enable a firm to widen the market from which its labour may be recruited. They may also be utilised to make available the specialised services which the modern firm requires from time to time and which are not readily available in the small community. Pre-eminent among the media of transport today is the provision of good, fast, and weatherproof roads. But other transport facilities, especially trains and aeroplane, must not be ignored.

1.25. In a relatively small and heavily populated country like the United Kingdom it should ultimately be possible to use transport facilities to diminish considerably the disadvantages of the smaller town. But some net disadvantage is bound to remain, if only because someone will have to pay for the cost of transport and

communication involved. What may ultimately have to be decided is whether we shall

- continue to pass much of the burden of transport costs on to the residents of smaller towns.
- increase the extent to which transport services are subsidized.
- subsidise transport services indirectly by subsidising the economic activities of the smaller town.
- undertake to remove and resettle the populations of towns which have ceased to be economically viable.
- create new and larger centres of population.

1.26. For the moment it seems sensible to avoid facing these cruel choices. The media of transport and communication are changing rapidly, and so is the degree of car ownership. It seems reasonable to argue, in such a context, that what is mainly required is a policy of delay until the pendulum swings decisively one way or another.

1.27. We must now move from these general considerations to their application in the case of the Central Borders. This region comprises a group of smallish towns placed from 30 to 50 miles from the nearest large centre. Its separation for study is in many ways rather arbitrary, since it has strong links with another group of towns comprising what may be called the Eastern Borders—centering on Kelso and Berwick—as well as with Edinburgh and other regions. The towns of the Central Borders have developed in the past through a marked degree of economic specialisation in various branches of the woollen trade, and in agriculture. Their difficulty at the present time stems partly from the pattern of structural change which has affected these industries. Agriculture has become more mechanised, and less labour intensive; while the wool trades have suffered from foreign competition and from the growing use of synthetic materials.

1.28. As a result of these forces the economic fortunes of the Central Borders have suffered

relatively to the rest of the country. Some of this can be seen in Table 1.1.

It will be seen that unemployment levels, and participation rates, are not particularly bad for the Central Borders. There has on the other hand, been substantial net emigration from the region. We have at present no firm evidence on the level of earnings for equivalent work in the Central Borders and in Edinburgh, but there is a good deal of circumstantial evidence on the subject. It appears likely that the level of female earnings is relatively high in the Borders, and this is supported by the volume of travel to work to the Borders from the southern suburbs of Edinburgh. It seems likely, however, that the level of male earnings is less satisfactory in the Borders than in some other parts of the country. This general picture is given support by the data on income distribution which is discussed in some detail in Chapter 5.

1.29. There are several basic decisions to be made, in these circumstances, on the economy of the Central Borders. The first is whether the prime reliance in economic strategy should be placed upon improvement in transport facilities within the region, and between the region and Edinburgh. This would have been a reasonably attractive strategy, but there are certain difficulties involved in this approach. In particular one may mention the roughness of the terrain to be traversed and the climatic difficulties to be overcome. There is also the confined nature of settlement at both Galashiels and Hawick to be considered. In the end something of a compromise position has been reached, with the improvement of the road joining Galashiels to the A68, and the utilisation of already planned improvements on the A68 (Edinburgh-Newcastle) as the central transportation element in the region.

1.30. Secondly a decision is necessary as to whether it would be reasonable to create a centre or group of centres in the region having a population which could be regarded as economically viable. Since the minimum population for economic viability of a relatively isolated region in the U.K. is probably upwards of 250,000 such a policy hardly appears very practical in the

Table 1.1
Activity Rates and Population Change

	YEAR		CENTRAL BORDERS			SCOTLAND			G.B.		
			M	F	Total	M	F	Total	M	F	Total
ACTIVITY RATE	1967 ¹		77.3	62.7	58.4	76.6	37.8	56.0	77.5	38.5	57.0
	1964 ² 1966 ³		75.7	65.7	59.5	76.5	38.8	56.3	76.7	39.2	57.1
POP. CHANGE	1961 Census Enumerated Population		74,983			5,178,490					
	1951-1961 ¹										
	Net Change	No.	-3780			+82075					
		%	- 4.5			+ 1.6					
	Net Migration		-4821			-254701					
		%	- 5.1			- 4.9					

Source 1. *The Scottish Economy 1967-70. A Plan for Expansion*. H.M.S.O. (1965, p. 12).
2. *Statistics of United Kingdom* supplied by the Ministry of Labour (Table 8, 12).
3. *Scottish Economy* op cit p. 56.

Notes 1. Population estimates by age group are not available for non-central parts of individual countries.
2. The very high activity rates for females in the Central Borders will be partly due to the programme now seen at 10 work from other areas: particularly Dalkeith.

Central Borders. It might indeed be possible to find enough suitable building land to provide accommodation for such a population at a cost that would not be altogether out of line with building costs elsewhere in the U.K. But the shortage of mobile industry in the foreseeable future is great, the infrastructure requirements of such a programme are considerable, and the effort involved would, on the whole, appear to be incommensurate with the gain to be achieved. On the whole the decision to limit the scope of the operation to a point well below that of the creation of a 'visible' economic unit appears to us amply justified.

1.31. Once having made these two decisions there remains only the question of the detailed location of the projected centres of economic regeneration in the Central Borders. We have discussed this topic in some detail in the chapter on location below, and the various possibilities can only be briefly sketched here. There are three principal possibilities:

- (a) using all population increase to create a new centre in the area
- (b) allocating population increase to the main existing centres or
- (c) distributing population growth over all the existing centres of population.

Each of these alternatives has its own advantages and disadvantages, and the same can be said about the solution proposed in the physical plan, which involved some addition to the population of the existing centres, together with the creation of a relatively small new centre of settlement in the Newtown-St. Boswells area.

1.32. The advantages of allocating population increase to the two largest existing centres of population, Galashiels and Hawick, are that this would provide the maximum direct economic impact on these towns and hence speed the process of redevelopment which is so obviously needed in them. Such a concentration would moreover keep down the amount of travel-to-work time required of workers, and would create the largest pools of effective economic demand and labour. Its economic disadvantage would be the need to utilise rather more difficult building land than is strictly necessary, and a somewhat higher cost of water and sewage services than could be had elsewhere. While it would allow a somewhat greater concentration of infrastructure investment it may be argued that such a policy would not offer the appeal to the popular imagination which a new centre of population might do. It is also sometimes suggested that new industries would be reluctant to move into a labour market dominated by a few well-established firms, although clear evidence is lacking on this point. We have not felt able, in this study, to consider a policy of concentration on those two towns, partly for the reasons cited above and partly because of the large redevelopment costs which might arguably be avoided by other strategies.

1.33. The spreading of population in small packets throughout the area might reduce travel to work to a minimum and would certainly

appeal to local loyalties. It would however increase the cost of infrastructure provision. It would reduce the stimulus to Hawick and Galashiels somewhat without providing the stimulus of an entirely new centre. And while it would ensure that no rivals to the two largest towns as service centres were allowed to grow up, it might reduce the size of the effective labour and service market available at any one place in the Central Borders.

1.34. The notion of complete concentration upon an entirely new centre in the Central Borders has obviously got a certain appeal on grounds of modernity, public interest, and amenity. It may be argued, as we acted above, that it has a strong appeal to incoming industries. In terms of water, sewage, and the cost of building it possesses advantages that are not negligible. It can offer, too, a possibility of further low cost expansion if, as and when a further expansion of population in the Central Borders occurs. Against these considerable advantages there is the fact that a total concentration of effort upon a new settlement would leave existing towns high and dry, without much hope of economic expansion and with no way to attract new industry. A new centre of population would moreover increase the travel-to-work burden considerably. It might, moreover, diminish the size and therefore the attraction to industry of any single pool of labour or demand in the area.

1.35. The proposals put forward in the physical plan are essentially a compromise between these three extreme possibilities. As such they may be said to have some of the virtues of each and to share some of the disadvantages of each. The existing larger towns are not completely neglected, but the stimulus to each is relatively small. There is a new centre of population but its projected size is too low to reap the full advantages of the conception. Nevertheless this plan may, if intelligently handled, provide the basis for a practical approach to the future of the Borders. In particular the division of the plan into an initial phase centring around the existing communities offers the maximum opportunity for frequent and orderly review of progress in the area. If, as may be possible, industry becomes attracted to the area on a larger scale than presently envisaged it will be possible to expand rapidly the settlement at Newtown St. Boswells. If, on the other hand, it proves more difficult to attract industry and population than had been supposed, a review of the position would become possible, and could proceed without being haunted by the spectre of enormous and irreversible commitment of infrastructure capital.

1.36. This chapter, and the ones which follow are, as previously observed, the result of a team effort. While the work has been specifically directed to the problems of the Central Borders, we have throughout attempted to see these problems as manifestations of the general problem of regional economic planning. This is especially important in the present case because

the economic problems of the Central Borders will, in all likelihood, be repeated more or less exactly in many places throughout the United Kingdom over the next decades.

1.37. The next chapter (Chapter Two) presents the basic material on population and population forecasts for the Central Borders. In the main we have had to be guided in this chapter by the projections supplied by the Registrar-General for Scotland. These projections take as a datum the premise (supplied by the White Paper) of an introduction to this area of 25,000 persons between 1971 and 1981, and we have already seen that this assumption is subject to the success of the Central Borders in attracting enough industry to provide employment opportunities on the appropriate scale. One aspect of these projections will be found particularly controversial: the assumption that net emigration will again become positive after 1981. While alternative assumptions are possible, there is something to be said for this one on the grounds that, as far as can be foreseen, the Central Borders will not have reached a 'viable' population by 1981, and may require further action if net migration is not to recommence in the 1980's.

1.38. Chapter Three is concerned with industry and employment. It points out the exceptional dependence of the Central Borders on agriculture and the woollen trades. While recognising that imbalance is a natural characteristic of small regions, and while admitting the economic advantages of specialisation and agglomeration, it points out the cyclical and structural risks inherent in such imbalance. The statistics indicate that the Central Borders has suffered from a relatively high proportion of what are, on the national scene, slow growing industries. They also show that the industrial composition of the Central Borders area has been remarkably slow to change, over the past two decades.

1.39. Two rather controversial results emerging from this chapter should be specially noticed. It is argued first that substantial further expansion in employment in the woollen industries in the Central Borders is not very likely. It is indicated, secondly, that on the basis of the 'average' mix of incoming industries to the Central Borders it is by no means certain that there will be a significant shortage of female employees by 1981.

1.40. The problems of the textile industry are further examined in an admittedly controversial Appendix to Chapter Three. While no finality should be attached to the arguments of this Appendix, they do suggest that serious further study of the structural problems of this industry might be warranted.

1.41. The fourth chapter provides estimates of manpower requirements in the social services to 1981 on rather liberal assumptions about the development of those services in the country as a whole and in the Borders in particular. It should be noticed that these estimates which are utilised in Chapter Three probably indicate the

upper limit to employment opportunities in this field. The Appendix to Chapter Four provides a theoretical model of one method of introducing quantitative considerations into the decision of the best location for a general hospital in the Borders. It should be noticed, however, that there are many alternative forms under which this problem can be tackled, and the results of this Appendix should only be taken as illustrative.

1.42. Chapter Five is devoted to the problems of housing and the construction industry. While the results are very optimistic as far as the demand for private housing is concerned, it should be pointed out that much of the argument depends on the assumption that the relative price of housing can be assumed to be independent of the level of real income. Different assumptions would give rather different results.

1.43. Chapter Six is in the nature of a pilot theoretical exercise designed to show some of the considerations which have to be borne in mind in attempting to strike a proper cost-benefit balance on optimal location. It also provides a critique of the so-called threshold analysis which is rapidly gaining favour in physical planning circles. While this chapter will be of limited interest to those with a purely practical point of view, it incorporates a good deal of material of interest to economists and planners.

1.44. Chapter Seven is a study of transport in the Central Borders. It attempts first of all to estimate the effect upon bus and rail travel of the introduction of new population into the area. It provides, secondly, a rough cost-benefit evaluation of the closing of the Waverley railway line between Edinburgh, Galashiels, and Carlisle. A somewhat novel approach is utilised which suggests that the argument for closing the railway and continuing the bus service is no stronger than the argument for closing the bus service and continuing the railway service.

1.45. The Appendix to Chapter Seven offers a theoretical generalisation of the argument of the chapter, and indicates the manner in which such general-equilibrium considerations may be incorporated in cost benefit analysis. The discussion is of substantial theoretical interest.

1.46. Chapter Eight offers a historical and geographical survey of the Borders. It will be found to contain a good deal of material, not hitherto easily available. It is perhaps inevitable that there should be some differences in approach and emphasis between economists and geographers because of the differences between their two disciplines. The reader will find some interesting contrasts in method and in conclusions between this chapter and those which have preceded it. In particular it will be noticed that the geographers regard the avoidance of competition between agricultural and urban or industrial land uses of considerable importance, while the economist is inclined to welcome such competition as a natural and inevitable outcome of the attempt to turn resources to their best use. Again the economist is inclined to see the problem of location in largely economic terms,

while the geographer, quite naturally, sees the problem in terms of the ease of physical conditions. The economist sees the redevelopment of cities and towns as a question largely of profit and loss or at least of cost-benefit balance, while the geographer is perhaps more aware of the physical and historical and cultural elements

involved. In many ways, however, the two approaches will be found to be complementary, each emphasising what the other neglects.

1.47. The Statistical Appendix brings together in one place most of the important tables and charts referred to throughout the volume.

Population

Introduction

2.1. The population of the Central Border Counties has been falling for the last half century. This is the result of the net emigration (excess of emigration over immigration) from the area exceeding natural increase. Table S.1 shows an almost uninterrupted decline since 1901. It does show a slight increase in the 1966 population over that of 1961, but it is very likely that the 1966 Census does not accurately represent the resident population, and that the trend for the decrease has continued through 1966. Loss of population through migration is common to Scotland as a whole, but Scotland has maintained an almost stable population in spite of the loss, even achieving since the turn of the century, a small increase of about 0.2 % per annum. This chapter is mainly a study of the implications of not merely halting the decrease of the Central Borders population, but of actually increasing it, by 1981, by about one third of its present volume. This increase is to be regarded as part of the plan for the expansion of the Scottish economy presented in the Scottish White Paper.¹

2.2. Though the White Paper envisages an increase in population of 25,000² the projection of the Registrar General for Scotland, which is adopted in this chapter gives an increase of 22,200. With this target in mind it will be the aim of this chapter to ascertain the population and its structure (by age and sex) at various intervals between now and 1981.³ Projections are also provided for 1986, that is, five years after the end of the planning period.

2.3. It will be obvious that a projection of the future population and its structure is a prerequisite for economic planning. In order to determine the number of jobs and school places to be provided throughout the planning period, it is necessary to know the numbers of people of both sexes of various age groups not only at the end of the period but at intervening dates as well. On the other hand, the implementation of the plan for raising the population of the Central Borders to the level indicated is contingent upon making jobs as well as housing available for the additional population. Housing by itself will not keep people in an area, for if wage levels and job opportunities are less favourable than in other areas, people will seek better opportunities elsewhere. The plans for industrialisation and housing are detailed in other parts of this Report.

2.4. A projection of the future population and of its age and sex structure necessitates the making of assumptions as to the volume of migration and the future trends of birth and mortality rates, for the migrants as well as the indigenous population.

2.5. The contemplated increase of 22,200 will of course be the net result of immigration, emigration and natural increase (births less deaths) though immigration will be the major factor. With regard to immigration it is assumed that large numbers will be attracted from the overspill of large cities outside the area. The estimation of future birth rates and mortality rates is always an exercise of uncertain reliability. It could be assumed that past trends of these rates would continue, but trends might well change and invalidate the projection. This is especially true of the birth rate, which depends on the age structure of females and their age-specific fertility rates. The latter is affected by marriage age and rate of marriage. It will be remembered that after a continuous decline, the birth rate in Great Britain rose again after the last war. The projection of future death rates is however, less uncertain than that of birth rates. It has been assumed that age specific death rates will continue to decline, and that fertility rates will fall slightly. In view of the uncertainties attaching to such estimates, they will be called 'projections' rather than 'estimates' or 'forecasts'.

The Central Borders population today

2.6. The White Paper on the Scottish Economy referred to above defines the Central Borders as the shires of Peebles, Roxburgh (excluding Kelso), Selkirk, and the Langholm District of the County of Dumfries. Table S. II, which is compiled from 1961 and 1966 Census data, gives 75,400 as the estimate of the Central Borders population in 1966.

2.7. The following projections, however, have been drawn in respect of the total population of the three shires of Peebles, Roxburgh and Selkirk without correcting for the inclusion of Langholm and the exclusion of Kelso. This is because separate detailed data for these two localities are not readily available. As can be seen in Table S. II, this makes a difference of about 4,000.⁴

2.8. Table S. III shows the birth and death rates for the three Central Borders Counties and

¹ Scottish Office, *The Scottish Economy 1965 to 1970: A Plan for Expansion*, Cmd. 2884 (1965).

² Scottish Office, op. cit., p. 47.

³ Other chapters have assumed the gross immigration of 25,000 has occurred by mid-1980.

⁴ It should also be noted that the total 1966 population for the three shires which will be used in the projections is 71,200 and not 75,400 as given in Table S. I. The figure of 71,200 has been obtained by the Registrar General and is closer to the true number of the resident population than the census figure for that year, which included an unusually large number of transient visitors and is, moreover, subject to sampling errors. Indeed, the relatively high figure given by the 1966 Census of 79,400 would, when compared with the natural increase between 1961 and 1966, lead us to believe that there was a net immigration of 400 persons between those two years. It is more likely that through emigration, the falling population trend continued during these five years.

for Scotland during the years 1961-6. The birth rates for the Borders are consistently below those for Scotland while the death rates are higher. The higher death rates result from the fact that the Borders have a higher proportion of elderly people than Scotland (see Table S. IV).

Table 2. I
Death rates, per thousand

	Scotland			Borders		
	1951	1961	1966	1951	1961	1966
0-4	8.6	6.4	5.3	6.1	5.9	3.6
5-9	0.7	0.4	0.4	0.9	1.2	0.1
10-14	0.5	0.3	0.3	0.7	0.0	0.0
15-24	1.2	0.6	0.7	0.4	0.3	0.4
25-34	1.9	1.0	1.0	1.3	0.9	0.1
35-44	3.2	2.6	2.6	3.0	2.6	1.8
45-54	8.2	7.1	7.1	7.8	7.7	6.6
55-64	20.4	19.2	18.3	21.1	17.6	15.6
65-74	30.3	45.9	40.9	45.4	41.4	40.7
75+	143.7	132.1	126.1	140.9	130.0	126.0

Sources: Quarterly Review of the Registrar General, Scotland, Births, Deaths and Marriages Registered in the Quarter ended 31st March, 1967, H.M.S.O., 1967, p. 18.

General Register Office, Edinburgh, Sample Census 1966, Scotland, County Report Berwick, Peebles, Roxburgh and Selkirk, H.M.S.O., 1966, p. 2.

Although the age-specific death rates are lower in the Western Borders than in Scotland as a whole as shown in Table 2. I.

Table S. IV also shows that the proportion of elderly people in the Borders has been increasing. The lower birth rates are due to a lower proportion of women in the child-bearing age (15-45) in the Borders than in Scotland as a whole (Table S. IV) and to lower age-specific fertility rates. The latter is partly due to lower marriage rates as is shown by the following figures for 1961.

Table 2. II
Proportion of married women, per thousand

Age	Scotland	Central Borders
15-19	58	38
20-24	516	519
25-29	803	783
30-34	842	852
35-44	828	812

Sources: General Register Office, Edinburgh, Census of Scotland 1961, H.M.S.O., 1964, Part 15 Peebles, p. 26 Part 20 Roxburgh, p. 26, Part 28 Selkirk, p. 28.

The Assumptions

2.9. The main sources of population growth will presumably be immigration from large urban areas such as Glasgow and Edinburgh. Emigration from the area will continue. Natural increase is expected to contribute only a small part of the increase of the population. The natural increase of the existing population is expected to be about 1,900 and that of the immigrating population will add a further 2,700.¹

2.10. In making the projections, the following assumptions have been made:

Mortality

1. The age specific death rates for the region, including any immigrant population,² have been assumed to show an improvement similar to that of the Scottish death rates in the 1966 projection for Scotland,³ namely, that at ages below 40 death rates will decline to about one half their present level over the next 20 years,

while at ages over 40, the rates of decline will become progressively smaller as age advances (see Table S. V). As can be seen in Table 2. I age specific mortality rates for both Scotland and the Central Borders have been declining.

Fertility

2. As is shown in Table S. VI, the projected fertility rates increase until 1966-71 then decline to a level slightly below their original level. The movement of the specific fertility rates follows closely that underlying the Registrar General's 1966 projection for Scotland.⁴

Migration

3. It is assumed that in the absence of the special measures to be taken to attract immigrants into the area, a net emigration of 500 per annum would occur. Figures of net migration usually conceal gross migrations in opposite directions many times as large. Such migrations are largely made up of people, mostly young, moving in search of employment. It is assumed that both the gross emigration and gross immigration (which would occur without any government interference) have the same age structure as emigrants from Scotland to England and Wales and overseas (see Table S. VIII), hence the same age structure has been applied to the net emigration of 500 people per annum, when calculating the age structure of the remaining population.

2.11. The assumption of a net emigration of 500 per annum is used in one projection (projection I), in which is calculated the number and structure of population up to 1986, in the absence of government intervention. It is also incorporated in another projection (II), which assumes that sufficient people will be drawn from the overspill of large cities to increase, by 1981, the total population by 22,200. These immigrants, numbering 25,000, are assumed to come into the area at a constant rate during the decade 1971-81. The age structure of this population is taken to be similar to that of the

¹These figures are approximate and they are obtained by adding the net increase of population over periods of 5 years, given in Table S. VII.

²It is assumed for simplicity that the immigrant population will have the death and fertility rates of the resident population.

³Quarterly Review of the Registrar General, Scotland, Births, Deaths and Marriages Registered in the Quarter ended 31st March 1967, p. 38.

Glasgow overspill to East Kilbride and is given in Table S. VII. It will be seen from Table S. VII that the overspill population has a smaller proportion of persons in the working age groups (15-60 for women, 15-65 for men) than have the Scottish emigrants to England and Wales and overseas; but both these migrant populations have a larger proportion of such persons than the 1966 Western Borders population. The structure of the Central Borders population is given in Table S. IX.

2.12. It is to be expected that some of the immigrants will leave, but it is assumed that they are replaced by immigrants of the same age and sex structure, so that the total number of net immigrants is 25,000 (ignoring the net outflow of 500 from the existing population). It is also necessary to assume that in spite of re-emigration, the rate of arrival of net immigrants over the decade 1971-81 will be constant.

2.13. It remains to justify the superimposition of the two net migration streams, namely that of the overspill population, and that of the natural drift (500 net per annum). It is assumed that the existing population will continue to leave the Central Borders, that immigration will continue from the same sources as it has done till now, and that the net outflow will still be 500 people per year leaving the Central Borders. It may well be that this assumption is too pessimistic, and that the net outflow will decrease or even be reversed, when the industrial development of the Central Borders takes place. It is retained, however, for the sake of simplicity, and to conform with the estimates of the Registrar General. Of course if the net emigration of 500 is an overestimate then the 1986 population shown in table S. VIII is underestimated.

The population projections

2.14. Table S. VIII shows the changes in population at five-yearly intervals between 1966 and 1986, and the sources of these changes: migration, births and deaths.

2.15. According to projection I which assumes a net outflow of 500 per year, the total population will fall by 5,200 by 1981 and by a further 1,800 by 1986. This is because the net emigration of 500 per annum much more than offsets the natural increase of below 200 persons per annum.

2.16. Projection II assumes an increase of population of 22,200 by 1981 after allowing for a natural outflow of 500 per annum. It requires an immigration of 25,000 between 1971 and 1981. It will be seen in Table S. VIII that, since the influx of immigrants begins only in 1971, the changes in population are the same for the two projections between 1966 and 1971. As the population in Projection II becomes much larger in 1981 than in Projection I, owing to immigration, the natural increase after 1981 becomes large enough to just offset the 'natural drift' of 500 per annum (should it continue thereafter), so that the population remains almost stable. Should there be no net emigration after 1981, then the population will rise through natural increase.

2.17. Table S. IX shows the structure of the population by age and sex, at five-yearly intervals between 1966 and 1986. Table S. X summarises Table S. IX and gives, for males and females separately, the number of persons in an age group as a percentage of the total population.

2.18. As expected, projection II ends up with a younger population than projection I, for both males and females, in the sense that the percentage of total population for every age group up to 45 is larger on projection II than on projection I (with one exception: the proportion of males in age group 15-30 is smaller in projection II than in projection I.) This is the outcome of the inflow of immigrants, who account for a higher proportion of the population in projection II than in projection I, assuming that the immigrants are younger than the existing population.

Industry and Employment

Introduction

3.1. The purpose of this chapter is to assess, within the context of a population increase of 25,000, what the industrial structure of the Central Borders will be by 1980 if the whole of the labour force is to be fully employed. This structure will consist of both the existing industry and the industry which will have been attracted into the area by that time. The influx of new industries will imply an improvement in the balance of the industrial structure in 1980 (by 'balance' is meant the extent to which the secondary sector is sufficiently diversified so as to withstand fluctuations in a few key industries). But here it must be pointed out that since a region as small as the Central Borders can never achieve the same degree of balance exhibited by the national economy, it is possible that a measure of improvement may be effected by 1980.

3.2. The analysis of the Central Borders industrial structure in 1980 involves the estimation of the size of both the incoming and the existing industries up to that date. The first step in this section will therefore be to predict the level of activity in the existing industries by 1980, and a pre-requisite to this must be the survey of the industrial structure as it is now and of the forces which have dictated its course in the past. Once the total demand for labour by these industries has been determined, the size of the incoming industries is then dictated by the difference between that demand and the total supply of labour available in 1980.

3.3. When an economist wishes to analyse a region his prime concern must be with the level of its economic activity. This activity has many important constituents, but of chief concern to the economist are (1) output, (2) productivity, (3) employment, and (4) the region's balance of payments. The dominating characteristic of the Western Borders, at least as far as this analysis is concerned, is its small size, which in practice means that the only statistics available are those relating to employment and unemployment by industry. This lack of statistics in the Central Borders effectively means that employment figures will now have to do the work of all the series mentioned above, especially that of output. Karmel has outlined the difficulties inherent in using employment indicators as a measure of the quantum of production. There is, for instance, the difficulty associated with the need to make adjustments for (1) holidays, (2) changes in the length of the working week, and (3) changes in overtime. But even if it were possible to make satisfactory provisions for these, the principal difficulty

would still remain, namely, that the employment indicators 'assume that labour productivity is constant. For short period comparisons this may be unimportant, but it becomes increasingly important in the long run.'¹ So the conclusions contained in the following analysis must always be interpreted against the background of these difficulties.

3.4. Another disadvantage of the smallness of the region lies in the fact that not only is there a general lack of statistics, but also that those which do exist are themselves subject to certain weaknesses. For instance the employment figures relate to the returns for Galashiels, Hawick, Peebles, and Jedburgh, but the returns for Jedburgh include Kelso, which is outwith the area of study. Also these figures do not relate to Langholm, which lies within the Central Borders. A further major weakness is that, partly as a result of the small size of the region and partly as a result of the predominance of the textile industry, the totals for several industries are so small, or even non-existent, that eleven of the industrial orders found in the secondary sector have had to be amalgamated with the category 'other manufacturing industry.' Even then this category only manages to employ 8.6 % of that sector's labour force.

3.5. As for the detailed statistics themselves, these can be found in Tables S. X to S. XXI, the interpretation of which requires that two other points should be mentioned. First, the definition of the textile industry differs between the national and the regional levels in the sense that the only branches of the industry found in the Central Borders are the hosiery and woollen ones. Secondly, the choice of the relatively short period 1959-66 was dictated by the fact that the figures available before 1959 were assembled on a different basis. Nevertheless, it was felt that the adoption of an eight-year period would still be sufficient to identify the main forces at work within the Central Borders.

Regional measures

3.6. At first sight the region might appear to be in a buoyant position, for the area exhibits the lowest unemployment rates in the country (see Table 3.1). These statistics further exhibit a remarkable consistency both as regards their small fluctuations about the average and as regards the tendency for males always to have higher rates than females. (Statistical Table S. XI). The conclusion to be taken from these figures is that, if the Government's full-employ-

¹ Karmel—*Applied Statistics for Economists* (Melbourne 1957), p. 342.

Table 3. I
Average Annual Unemployment Rates by Region
1959-1964

Borders	0.81
South East	1.2
South West	1.7
West and East Midlands including Humber and	
Yorkshire	1.2
North West	2.1
North	3.2
Wales	2.9
Scotland	3.6

ment figure of 1.5 % is to be accepted, the Central Borders is suffering from a state of over-full employment. The cause for this can usually be found in too fast a rate of industrial expansion within a region, but it could also be caused by an adverse industrial structure inducing a high net emigration from the region. That there is a high net emigration from Central Borders has already been indicated by the population figures. That there is also an adverse industrial structure will be illustrated in the following paragraphs.

3.7. The absolute size of the various industries found in the Central Borders is given in Table S. XIII, but for analytical purposes it is more meaningful to express the employment in each industry as a percentage of the total labour force in the region and then to compare this with the corresponding national figure. These, which are shown in full in statistical Table S. XIV, are also summarised in Table 3. II.

Table 3. II
Employment as a Percentage of the Labour Force

	Total Labour Force		Sector's Labour Force	
	Central Borders	National	Central Borders	National
Primary Sector	13.0	4.9	13.0	4.9
Agriculture	13.0	2.1	59.0	48.0
Secondary Sector	43.2	38.2	43.2	38.2
Textiles	37.3	3.5	18.4	9.0
Other Manufacturing	3.7	24.4	8.6	62.6
Tertiary Sector	43.8	56.9	43.8	56.9
Transport	2.9	7.9	6.7	15.0
Distributive Trades	10.1	13.0	23.0	22.0
Financial, Professional and Scientific	7.9	13.0	18.0	25.4

3.8. These statistics reveal that the primary sector is not only larger than in the national case in terms of labour absorption but also is dominated by agriculture. (At the national level agriculture employs only 48 % of the sector's total labour force). Like the primary sector, the secondary sector is relatively larger than that of the national economy, providing 43.2 % of the region's job opportunities compared with only 38.2 % at the national level. Also, like the primary sector, the secondary sector is dominated by one industry, that of textiles, though in this instance the consequences for the rest of the economy are far more serious. The textile industry in fact absorbs 86.4 % of the secondary sector's labour force (the comparable figure for the nation as a whole is 9.0 %) and this is more or less equally distributed between the hosiery and woollen trades (40.2 % and 46.3 % of the sector's labour force respectively). As a consequence of the dominating position of the textile industry, it is not surprising to find that the remaining manufacturing industry subsumed

under the heading 'Other Manufacturing' is under-represented.

3.9. The main distinguishing feature of the tertiary sector is that it only provides jobs for 43.8 % of the labour force compared with the national figure of 56.9 %. This is due to under-representation in the transport, distributive trades, finance, professional and scientific and public administration categories. For the first there is perhaps no obvious explanation, other than the absence of a transport centre in the region, but for the rest the situation may well reflect both the lower level of income in the Central Borders and its proximity to the service centre of Edinburgh.

3.10. The foregoing remarks serve to illustrate one of the main features of the Central Borders' economy, namely, the under-representation of the tertiary sector. This is due partly to the primary sector being three times the national size, but mainly to the predominance of the textile industry. The region is notably unbalanced—as indeed are most small areas. The extent to which the industrial mix of a region differs from the national average may be measured by computing the 'co-efficient of specialisation', which is obtained by summing the differences between the percentage of the total labour force employed in each and every industry at the national and regional level, and dividing the result by 100.¹ If the region has a

proportional mix of industry identical to the national average, the co-efficient will be zero, whilst if all the employment in the region is concentrated in a single industry the co-efficient will approach unity. These co-efficients, both for the Central Borders and for other regions, are summarised in Table 3. III, and, although the co-efficients do not measure the extent of

Table 3. III
Regional Co-efficients of Specialisation

Central Borders	0.89
Yorkshire and Humber	0.42
North East	0.28
East Midlands	0.53
South East	0.22
North West	0.34
Wales	0.41
Mid-Wales	0.66

Sources: Ministry of Labour
Abstract of Regional Statistics 1964.
A see also in Mid-Wales Welsh office 1966.

¹The main weight should not be placed upon this and other co-efficients, especially because the individual industries are not weighted by size. The co-efficient of specialisation is useful in indicating the extent to which a region's industry is concentrated in one particular field, but it must not be interpreted as anything more than a descriptive device.

industrial concentration in absolute terms, they do serve to show the relative differences between the regions. It is clear from Table 3.III that with a co-efficient as high as 0.89, the Central Borders must be considered as exhibiting a much higher degree of specialisation than is generally to be found elsewhere. It seems likely that this will remain true even when account is taken of the fact that the degree of specialisation varies inversely with the size of the region.¹

Past trends

3.11. In analysing a region with a view to predicting its future growth pattern it is necessary not only to study its economic structure, but also to investigate the way in which this has developed in the past. In Table 3.XV the annual rates of change in employment for the years 1959-66 are set out and in Statistical Table 3.XVI the growth rates for this period are compared with the corresponding national figures. The main characteristics are also summarised in Table 3.IV.²

Table 3.IV

Compound percentage change in Employment 1959-1966

Industry	Central Borders	National
Primary Sector	-1.1	-4.4
Agriculture	-1.1	-4.6
Secondary Sector	1.7	0.0
Textile	1.4	-1.6
Hosiery	3.7	-2.9
Woolen	-0.9	-1.8
Engineering, Electrical	14.9	2.7
Tertiary Sector	0.6	2.2
Distributive Trades	0.7	1.4
Miscellaneous Services	0.3	2.0
Professional and Scientific	3.3	3.2
TOTAL	0.8	1.8

3.12. From these tables it can be seen that agriculture has shown a persistent if somewhat erratic decline, though this decline has been much less than the national average (1.1% and 4.4% respectively), a fact which has no doubt been associated with the predominance of hill farming in the region and the concomitant lack of scope for mechanisation. This slow decline has meant that, for the region's economy as a whole, labour has not been released for secondary employment at what may be regarded as a normal rate.

3.13. Superficially, from Table 3.IV, it would appear that the secondary sector is growing faster than the national average. But as was stressed in paragraph 3.4 the statistics for a region as small as this can be misleading. This rise is due basically to an exceptional upturn in employment in the woollen industry in the years 1959 and 1960, and in order therefore to get a true picture of the textile industry's performance this period should be discounted. Although, on this basis, the woollen industry fared better than the national average, at best it may be thought of as holding its own. The hosiery industry, on the other hand, has been growing persistently over the period, with the result that the growth rate of 3.7% is approximately four times that of the national figure. The engineering and electrical industries, apart from a sharp rise in 1960-1 and 1963-4 (associated with changes

within one firm only), would appear to be following reasonably closely the national growth rate of 3.0%.

3.14. The figures for the tertiary sector are not only smaller than the national average, but also show a slower growth rate, though apart from 1959-60, this sector showed no actual decline in the Borders. This low growth rate probably arises from the peculiar stagnation of the distributive trades, the miscellaneous services and the construction industry, all of which are relatively large employers of labour and are clearly growth industries at the national level. The explanation for this is probably the same as that adduced in paragraph 3.9 for their relatively low percentage employment figures.

3.15. Paragraphs 3.11 to 3.14 have highlighted the more important trends associated with the industries individually, but the question of what net effects these trends have had on the region's economy as a whole has still to be answered.

3.16. One aspect of an economy's development that is important here is the extent to which the industrial structure has changed throughout the period under consideration. This can be neatly summarised by the 'coefficient of redistribution', which is calculated in a manner similar to the 'co-efficient of specialisation', except that this time the 1966 distribution of the labour force is compared with that as it was in 1959, rather than with the current national industrial structure. A co-efficient of zero indicates no change, the greater the change being the closer will the co-efficient approach unity. For the Central Borders this co-efficient is found to be 0.096. This is a very low figure, indicating that the region has been slow to change and therefore to adapt its industrial structure to modern needs.

3.17. Further light can be shed upon the growth potential of the region by determining which industries exhibit above average concentration and which below average, and which of these are growth industries and which are

Table 3.V

Location Quotients by Industry in the Central Borders

Growth Industries	
Professional and Scientific	0.76
Insurance, Banking and Finance	0.46
Construction	1.0
Other Manufacturing	0.15
Engineering and Electrical	0.23
Distributive Trades	0.78
Average Industries or Irregular Growers	
Coal, Electricity and Water	0.41
Miscellaneous Services	1.1
Below Average Industries	
Public Administration	0.29
Transport and Communication	0.41
Textile: (a) Hosiery	14.6
(b) Woollen	25.0
Agriculture	6.2

declining industries. For each industry the location quotient (L.Q.) can be calculated by taking the percentage employment in the region

¹ It should, of course, be noted that specialisation tends to bring an improvement in total efficiency from factors the distribution of which is such that one region may lose efficiency.

² Except where otherwise stated, growth rates are compound growth rates.

for each industry and dividing by the corresponding percentage for the whole of the economy. An L.Q. greater than unity will indicate above average concentration. The various L.Q.'s for the Central Borders are shown in Table 3.V. Except for the construction industry, each of the growth industries have low L.Q.'s, whilst the greater part of the declining industries have high L.Q.'s. Table 3.V therefore indicates the undoubted predominance of the declining industries in the Central Borders.

Summary of economic structure and past trends

3.18. The conclusion to be taken from paragraphs 3.6 to 3.17 is that the unemployment figures disguise a fundamental imbalance in the Central Borders. The domination of the textile industry has imposed upon the economy a considerable degree of concentration as evidenced by the co-efficient of specialisation. The textile industry effectively is the sole employer in the manufacturing sector and this has resulted in a general shortage of job opportunities for males, and consequently high emigration rates from the region; this in turn has served to aggravate the shortage of female labour in the textile industry. A study of the past trends reinforces this picture and also shows how slow the economy has been to adapt. Further, the industrial structure is heavily orientated towards the contracting industries, and those growth industries which are represented, basically the service industries, have not expanded as fast as at the national level, a fact no doubt associated with the nearness of Edinburgh. The only evidence which runs against this general argument is provided by the relatively large differential shift exhibited within the economy, illustrating that, within the broad context of declining industries, the Central Borders industry remains relatively competitive.

Future industrial structure

3.19. Paragraphs 3.6 to 3.17 have summarised the main features of the economic structure of the region and the forces which have dictated its growth in the past. With the aid of this analysis it may now be possible to predict to a certain degree what the industrial structure may look like in 1980. The size of the existing industries will be determined, firstly, by the expansion of all the industries now present and, secondly, by a further 'induced' expansion of the service industries resulting from both the increase in activity in manufacturing sector and the increase in population. The difference between the employment in the existing industries and the total labour supply available in 1980 will then determine the size of the incoming industries. It should be pointed out that this distinction between the incoming and existing industries is useful but not complete, since it has not always proved possible to separate the two concepts, a fact which will become clearer when the individual industries are studied in detail. For convenience, productivity effects are generally analysed under existing industries, whilst

new firms are dealt with exclusively in terms of the allocation of the surplus labour resulting from the net immigration to 1980.

3.20. The statistics on past trends have already been summarised in paragraphs 3.6 to 3.17 and are set out in full in Table 3.XV.

Agriculture

3.21. Although the rate of decline of employment in agriculture in the Central Borders has been less than the rate for the national economy in the period under review, this rate has been increasing (Table 3.XV). The national rate might well, therefore, be more indicative of the trend in employment decline. Moreover, it seems reasonable to expect that continuing mechanisation and improved efficiency in agricultural production will further reduce the demand for labour by the agricultural sector,¹ although this rate of decline may level off towards the end of the 1970s as mechanisation becomes more extensive. For these reasons a rate of decline for the period 1966 through 1980 of 4.0% has been used. This might prove to be somewhat pessimistic if the U.K. were to enter the Common Market. Livestock are an important element in the agricultural sector of the Western Borders, and recent analyses² have suggested that British beef in particular is likely to compete effectively with the product of the Common Market countries. However, transport costs may well offset any potential increase in demand for British produce as a result of this price differential. Additionally, any increase in demand may be met at least in part from under-utilised resources on many of the farms.

Engineering and Electrical

3.22. This industry has shown rapid but erratic increases in employment in the Central Borders during the period 1959-66. This compares with the much lower but still somewhat erratic increase in the national economy. Nevertheless the level of employment in the Central Borders is still extremely low, and this has resulted in disproportionately large increases in employment each time a new firm is established or each time there is an expansion in an existing firm. Because this is an industry for which the main expansion will undoubtedly result from the inflow of new firms, a relatively low growth rate of 1.9% is allowed for in the period 1966 to 1980. However, output increases may be twice as high as the employment increase if the projected productivity increase for the industry³ in the U.K. applies to the Central Borders over this period.

Textiles

3.23. *Hosiery.* Employment has been increasing nationally as well as in the Central Borders during the period under review, although the rate of increase has been much higher (3.7% per year) for the Central Borders than for the national economy (0.9%). This differential

¹See, for example, *Westminster's British Economy 1975* (Cambridge 1975), pp. 230, 231.

²U.A.E. *Price of Agricultural Products in Europe* (1964-5).

³*Westminster*, op. cit.

rate of increase in employment is probably due, at least in part, to the relatively high quality of the commodities produced, since this end of the commodity spectrum has been associated with expanding demand. Improved methods of production, including greater mechanisation, will accompany any further expansion in output and it would therefore be more reasonable to assume static employment for this product over the period 1966 to 1980.

Woolfens. The rate of decline of employment in the woollen industry in the Central Borders has been increasing during this period, as it has at the national level also. In the light of both these figures and the comments in Appendix A, two separate assumptions have been made about the rate of decline of the woollen industry up to 1980. The first (-0.5%) may be taken to be a slight worsening of the trend in the Borders, but is still better than the trend in employment in the National woollen industry; a reason for this might be the possible expansion of production as the shortage of labour becomes less important. The second assumption (-2.0%) takes into consideration the apparent deterioration in the rate of decline over the period 1959 to 1966 in the Central Borders. This too is implicit in the discussion of some of the points in Appendix A.

Other Manufacturing

3.24. Employment in these industries has remained relatively static throughout the period 1959-66. Although the employment levels in the national economy have shown slight increases over this period, it has been assumed, partly as a result of the more detailed analysis in the next section of this chapter, that the rate of growth of employment in these industries in aggregate will again be zero.

Construction

3.25. This sector is analysed in greater detail at the end of this chapter. The population increase of 25,000 will mean an increase in demand for construction services, which in turn implies a 3.1% annual growth in employment in the Central Borders between 1966 and 1980. This figure, which lies between the past growth rates in the Central Borders and the national economy, implies continuing increases in productivity.

Gas, Electricity and Water

3.26. Employment in the Central Borders has shown marked fluctuations around an overall decline throughout the period, compared with an expansion of a similar numerical magnitude at the national level. Even if the demand for these services in the Central Borders increases at a similar rate to the increase in demand in the national economy, it would still seem that more extensive centralisation of employment will result in a decline in employment in the Central Borders. Accordingly, a decline of 2.1% per annum in employment in these industries has been assumed for projection purposes. This allows also for possible increases in productivity

in these industries as output expands in aggregate.¹

Transport

3.27. Employment in this industry has been declining both nationally and in the Central Borders over the period 1959-66, although it has declined much faster in the Central Borders. It has been assumed that the annual rate of decline of employment will continue to be fairly rapid at 4.2% , a figure which is marginally higher than that for the period 1959-66 in the Central Borders. Nevertheless it is still much higher than the corresponding national figure, whether viewed from its past performance or its projected increase.² It is rationalisation of the transport services that is expected to be the major factor behind the relatively high rate of decline for this region.³

Distributive Trades

3.28. Employment has increased at a comparatively slow rate for the Central Borders and for the national economy, during the period 1959-66. However, for the period 1966-80, employment is expected to decline at -0.4% in the Central Borders, as productivity is increased in accordance with the expanding scale of operations resulting from the increased population.

Insurance, Banking and Finance

3.29. The increase in employment in the Central Borders has been 4.1% per annum over the period analysed compared with the slightly lower rate of 3.7% for the national economy. This trend is expected to continue albeit at a slightly slower rate of 3.3% . The reasons for this rate include both the difficulty in establishing higher rates of productivity and the expected continuing increase in demand.

Professional and Scientific

3.30. This industry is a relatively large employer of labour in the Central Borders as it is to an even greater extent in the national economy. A particularly high rate of increase in employment in the Central Borders for the years 1965-66 has increased the growth of employment for the period under review from 1.5% (1959-65) to some 3.4% (1959-66). Further, employment in the Central Borders may well not grow as fast as in the national economy because of the proximity of Edinburgh which is the centre for many of these particular services. For these reasons a rate lower (1.3%) than both the overall growth in the Central Borders and the growth in the national economy has been chosen, but this is still higher than the rate which occurred for the period 1959-65. This rate reflects again a high income elasticity of demand and a low productivity increase.

Miscellaneous Services

3.31. A rate of growth of 2.0% has been

¹See *Bordersman* op. cit.
²*Scottishman* op. cit.
³See Chapter Seven below.

chosen for this branch of the services, which is the same as that for the period 1959-65 in the Central Borders. This rate is considerably higher than that for the period 1959-66 because of the sharp reduction in the employment figures for the years 1965-66. This extrapolated rate is nevertheless near to the national average for the period under review.

Public Administration

3.32. Employment in this service has declined in the Central Borders over the period by some 1.7% per year compared with an increase of 1.4% per year for the national economy. Again, this phenomenon may be explained by the relative proximity of Edinburgh, which provides a number of these services. It would seem reasonable, therefore, to assume that the national economy will continue to expand at a rate much faster than that for the Central Borders. Again, the growth in size of the Central Borders population may well cause the decline in employment to be slowed down if not stopped altogether. It is assumed then, for this analysis, that there will be no change in employment in Public Administration, except for the direct impact of the incoming population a factor dealt with in the next section.

1980 Employment

3.33. The effects of applying the above growth rates to the various industries in terms of their expected employment for 1980 are summarised in Tables S. XVIII and S. XIX. The second column in these tables denotes the numbers which might be expected to be employed by the existing industries if the above rates prevail. The next stage therefore is to determine the supply of labour given the level of population in 1980. It is assumed that the activity rates are 76.4% for males (this being slightly lower than the 1964 rate for Scotland) and 42.0% for females (this is somewhat higher than the rate for Scotland as a whole in 1964 which was 38.6%, but it is no higher than the 1964 rate for the Midlands and might be expected to be the result of the current shortfall of female labour supply); if it is further assumed (see Chapter 2) that 74% of the female population and 70.8% of the male population are aged 15 or over, it can be seen that some 26,396 male and 15,664 female employees will be available for employment by 1981.

3.34. A service employment multiplier effect may then be expected to operate. If the whole of this supply of labour is employed, a proportion of it must be allocated to those industries which provide services for the total population. Leaving aside the construction industry, which is dealt with below, gas, electricity and water are expected to account for some 1% of the incoming population. This 1% is higher than the existing Borders proportion of the total labour force in the gas, electricity and water industries but is still appreciably below the 1.7% for the national economy. The transport industry is unlikely to expand to the 7% which exists at present for the national economy—indeed the

2.9% for the Borders may well prove itself to be somewhat high as a result of both the lack of a large urban centre in the area and of the relative under-utilisation of existing capacity. Accordingly, therefore, a level of 2.5% of the incoming population has been applied. Distributive trades for national economy account for 13% of total employment compared with 10.1% for the Borders. An increase (11%) in this proportion has been made so as to allow for the increased viability of the distributive trades as the concentration of population increases and certain shopping thresholds are crossed.

3.35. Insurance, banking and finance account for a disproportionately small level of employment in the Central Borders (it is in fact half that of the national economy). This is due in part to the proximity of Edinburgh which provides many of these services. Again, the rate might be expected to increase somewhat as a result of the incoming population intensifying the concentration and expanding the level of population. It would appear reasonable, therefore, to allocate a level of over 2% of the marginal labour supply in the Western Borders to this industry.

3.36. Professional and scientific services again account for a higher proportion of employment in the national economy than in the Borders' economy. For the same reasons as for the preceding industrial group, it has been assumed that this proportion in the Borders will be slightly increased by the expansion of the population. Accordingly, a level of 10% of the extra labour has been applied. This is also adopted for the miscellaneous services, where there is little variation between the national economy and the Borders' economy (10% is the mean of these two narrowly divergent figures).

3.37. Public administration again shows a lower proportion of population for the Borders than for the national economy. But administrations which are currently centred upon Edinburgh and London are not expected geographically to shift into the Western Borders and therefore a level of employment of the extra labour of some 3.5% is applied. This is barely above the current level of employment for the Western Borders, i.e. there is not expected to be any benefit in increased relative employment accruing to this industry as a result of increasing the level of population.

Incoming Industries

3.38. In paragraph 3.33 it was shown that the industries now present will be expected to provide employment by 1980 for 35,173 or 36,258 people according to whether the low or the high projection for the textile industry is accepted. In addition, it is expected that the service industries will be induced to expand by 2,770 or 2,332 jobs, again depending upon which of the above assumptions is adopted.¹ The individual results for the service sector are summarised in Tables S. XVIII and S. XIX. These figures, together with those for the

¹It should be noted that implicit in this analysis is the assumption that the necessary adjustments will take place in a short space of time.

industries now existing, imply that by 1980 the total number of jobs available will be either 37,943 or 38,590 (low and high projections respectively). However, in paragraph 3.33 it was indicated that by 1980 the size of the labour force will be 42,060, which means that by then there will be a shortfall of 4,117 or 3,470 jobs.

3.39. In order to redress this imbalance between the demand and supply of labour, new manufacturing industries will have to be attracted into the region. This raises two issues. First, what types of firms are likely to choose to re-locate in the Central Borders? Secondly, what effect will these incoming firms have on the economy of the region, especially with reference to the demand and supply for males and females?

3.40. Some indication of the potential industrial structure of the incoming industries can be gained from a study of the composition of the manufacturing sectors of those New Towns already established in the U.K. To this end a separate survey was conducted amongst the various Development Corporations, who were asked to supply information on the type and size of the firms which had moved into their area. The returns from the individual Development Corporations were aggregated and the breakdown of employment between the various S.I.C. orders computed. These results are summarised in Table 3. VI for both the U.K. and for Scotland.

3.41. If the same industrial composition is assumed for the incoming industries in the Central Borders, then the distribution of the shortage of jobs will be as given in Tables S. XVIII and S. XIX. However it might well be expected that the peculiar characteristics of the Central Borders will result in a composition that diverges significantly from the average of all the firms locating in New Towns. These characteristics will effectively impose limits upon the degree of sophistication in the backward and forward linkages that a firm can exhibit and still remain viable in the Western Borders. This is a

Table 3. VI

Percentage distribution of employment by manufacturing industry in Development Corporations

Industry	Order	U.K.	Scotland
Food, Drink and Tobacco	III	6.5	2.4
Chemicals and Allied Industries	IV	4.2	2.4
Metal Manufacture	V	5.4	10.5
Engineering and Electrical	VI	52.3	38.9
Vehicles	VIII	3.2	18.6
Metal Manufacture not elsewhere specified	IX	8.9	4.2
Clothing and Footwear	XII	5.3	7.6
Bricks, Pottery and Glass	XIII	0.3	—
Timber, Furniture, etc.	XIV	1.7	—
Paper, Printing and Publishing	XV	4.4	18.0
Other Manufacturing	XVI	7.9	5.4
TOTAL		100.0	100.0

relatively small region, somewhat remote from the main U.K. markets and offering only a small industrial base to incoming firms. Typically this implies that any firm which relied heavily upon access to its markets would be at a disadvantage, for example a firm committed to a daily delivery of component parts to the motor car industry. Further, any firm which was dependent upon a particular kind of skilled labour or upon an input of specialised services or upon close proximity to its suppliers would again be at a relative disadvantage in the Central Borders.

3.42. Table 3. VI, in which the Scottish figures are compared with those for the U.K., lends statistical support to the notion that the industries attracted to any particular region are likely to differ significantly from the national average. From this table it would appear that Scotland has managed to attract more metal manufacturing but less electrical and engineering industries; further significant divergencies from the national figures are a high representation in the Vehicle and the Paper, Printing and Publishing orders.

3.43. Nevertheless, for the purposes of this study, the national figures have been adhered to, not because they are in any way uniquely correct, but because it would be meaningless to assess in detail how any one region is likely to diverge

Table 3. VII

Final Industrial Structure Hypothesised for 1980

Industry	Low Textile	Projection	High Textile	Projection
	%	Total	%	Total
Agriculture	0.0	2,553	6.1	2,553
Food, Drink and Tobacco	0.6	268	0.3	226
Chemicals and Allied Industries	0.4	173	0.3	146
Metal Manufacture	0.3	222	0.4	187
Engineering and Electrical	8.3	3,490	7.5	3,152
Vehicles	0.3	132	0.3	131
Metal Manufacture not elsewhere specified	0.9	366	0.6	309
Textile	27.7	11,435	30.2	12,720
(a) Hosiery	16.4	6,894	16.4	6,894
(b) Woollen	11.3	4,741	13.8	5,626
Clothing and Footwear	0.5	214	0.4	180
Bricks, Pottery and Glass	—	12	—	10
Timber Furniture	0.2	70	0.2	59
Paper, Printing and Publishing	0.4	182	0.4	157
Other Manufacturing	3.9	1,633	3.8	1,582
Construction	8.6	3,615	8.6	3,615
Gas, Electricity and Water	0.9	376	0.9	365
Transport	1.8	743	1.7	716
Distributive Trades	19.3	4,328	19.0	4,588
Insurance, Banking	2.2	914	2.1	890
Professional and Scientific	10.4	4,374	10.1	4,265
Miscellaneous	13.7	5,345	12.4	5,216
Public Administration	3.4	1,415	3.3	1,377
TOTAL	100.0	42,060	100.0	42,060

from the national norm. But although the national figures have been adopted, it must be stressed that the interpretation of the conclusions in this section must always be made against the background of the remarks made in paragraphs 3.40 and 3.41. In Tables S. XVIII and S. XIX, the shortfall of the jobs both for the high and the low projections for the textile industry have been allocated according to the structure found in the Development Corporation returns. The employment levels associated with the expansion of the industries now present, the induced expansion of the service sector and the incoming industries may now be aggregated to give the total industrial structure expected by 1980 (see Table 3. VII).

3.44. Finally, it now only remains to consider the second question posed in paragraph 3.39, namely to what extent do the above industrial structures imply an imbalance in the demand and supply for males and females respectively. In paragraph 3.33 it was calculated that by 1980

the total supply of labour would be 42,060, split as to 26,396 males and 15,664 females. The individual demands for males and females can be calculated from the total employment figures given the relevant male/female ratios. If it is assumed that the rates now being experienced by each industry will persist up to 1980, then it can be seen from statistical Tables S. XX and S. XXI that for the 'low' textile assumption there will be a demand for 25,729 males and 16,331 females, while for the 'high' textile assumption the demand will be for 25,712 males and 16,348 females. The foregoing remarks imply a shortfall in supply of 667 and 684 females ('low' and 'high' projection respectively). The position is reversed for males, the figures implying a shortfall in demand of 667 and 684 respectively. Nevertheless the conclusion to be taken from these figures is that these imbalances are not of great significance, especially since in practice, as stated in paragraphs 3.41, and 3.42 there may be a wide variance in the composition of the incoming industries.

Appendix A to Chapter 3

The Textile Projections

3.45. In any appraisal of the future pattern of industrial development the Border textile industry is a key factor. As such it merits some individual attention. Small in capital and employment compared with modern flow production industries, or with the traditional cotton textiles of Lancashire, it has nevertheless achieved a commendable record of exports since 1945. Within the industry there are wide variations in size, efficiency, and products. Plant ranges from modern factories to cramped and unsuitable warehouses; machinery from the ultra-modern to ancient looms. Markets display a similar diversity varying from one-off lots for foreign buyers to supplying multiples on the home market. Altogether there is an incredible variety of fancy weaves available matched by almost as many sorts of yarn. The hosiery division, located mainly in Hawick, displays more homogeneity than the woollen but still has considerable variation in size and product.

3.46. Ownership throughout the industry has traditionally been in private hands but mergers and take-overs have become rather more common in recent years. As might be expected the quality of management varies greatly from the enterprising and energetic to those who, unconsciously perhaps, are virtually living on their capital.

3.47. In general the woollen manufacturers have tended to meet a high quality demand from relatively higher income groups. Of this it would be fair comment to conclude that it has been the slow growth of such markets, combined with labour

shortages and insufficient capital, which has limited expansion. Hosiery has on the whole been geared to meet a more broadly-based demand. Both divisions of the industry have been sensitive to fluctuations in economic activity here and abroad (notably the successive credit squeezes).

3.48. It has already been noted that Hosiery is largely concentrated on Hawick. The projections indicate an increase in the labour force of between 14 and 750, and an explanation of this divergence is necessary. First it should be indicated that a wide margin of variance was introduced by the large and unexpected increase in the labour force in 1965-6 (736). This was three times as great as any previously indicated annual increase. However it has been incorporated in the estimates. The next point is that the existing technological coefficient in the industry, that is, the ratio between labour and capital, could change markedly, with radical effects on estimates of employment. As regards machinery and methods now present in Hawick not only are substantial economies available with size but amalgamations could lead to a better use of the existing labour force. The effects of this are hard to quantify and further information as to optimum mill size, here and abroad, is desirable. Thus, the low estimate figures which are the ones used in the analysis in this chapter would imply that marked economies had occurred in the industry and that the labour force had stabilised at around 7,000. This high figure assumes a limited amount of rationalisation, increasing output, and a labour intake of 750 over the

Table 3. VIII

		1966	1980	Change
Hosiery	High employment projection	6,880	7,630	+750
	Low employment projection	6,880	6,894	+14
Woollens	High employment projection	6,262	5,826	-436
	Low employment projection	6,262	4,741	-1,521

period. Another alternative, not indicated, would be to assume no change in the pattern of ownership and production, in which case employment by 1980 could reach almost 8,000.

3.49. With woollens the situation is somewhat different and less predictable. A decline in employment of between 436 and 1,521 is postulated, but it would be spread over a wider area—Galashiels, Selkirk, Melrose, Peebles, Innerleithen and Walkerburn. The variation in the estimates reflect (1) different estimates of market growth, and (2) the degree of concentration of output achieved. As they stand the figures do not indicate where contraction will occur and by implication it is assumed to centre on Galashiels. A more logical assumption might spread the reduction evenly over the relevant woollen mills. On current estimates of employment this might suggest the following long term reduction in mill labour:

Galashiels 150-600; Selkirk-Melrose 120-450;
Peebles-Walkerburn 100-350.

If this occurred it would strengthen the case for a primary industrial concentration at Galashiels with secondary concentrations at St Boswells and the Peebles-Innerleithen-Walkerburn area.

3.50. However, such an approach ignores qualitative as distinct from quantitative considerations. The woollen industry has been achieving increased production over the years in conjunction with a steady reduction in the labour force. Unfortunately this pattern does not apply throughout the entire industry. Many small firms with specialised markets have changed little. Others geared to more dynamic markets have expanded and, in fact, could use more labour. From this it would appear that an assumption that contraction would be spread out uniformly is untenable; in some cases decline will be larger than indicated, in others increased employment may occur. A somewhat tentative conclusion based on size of firm, ownership and market orientation

suggests (a) that employment in the Peebles-Walkerburn area in textiles may not decline, and (b) that contraction in Galashiels and Selkirk is likely to be around the median of the range indicated above.

The Possibility of Rationalisation

3.51. If, as seems likely, some contraction is to occur in the woollen industry, there might be a case for further study of the implications of the process accelerating—with the added possibility of generating increased employment in textiles. The case rests mainly on markets. At present the industry is geared largely to supplying quality goods to higher income groups. In Britain the number of potential customers has risen slowly for this because of the slow rate of national growth and the industry has compensated by selling more to faster growing countries abroad. However, it is by no means certain that such markets will continue to grow. While there will always be a demand for high quality products, of recent years the Dutch and Italian manufacturers have shown that a well-designed technically 'inferior' product offers serious competition to the best—particularly with the ever-more-affluent younger generation. The industry might seek a more broadly-based market for products still of good quality. This might call for increased production in larger units and, conceivably, increased employment opportunities. Obviously the technical aspects of such a proposal are complex and soluble only by the industry itself. From a planning point of view, it would ease some of the difficulties imposed by haphazard contraction if a scheme to rationalise the industry could be evolved. The number of spindles and looms involved is not large and the cost of voluntary relinquishment of capacity in return for compensation might be cheaper in the end than having to meet the problems created by sporadic mill closures. In woollens a 20% cut in weaving capacity might be appropriate, and 10% in hosiery; total output in both instances would increase.

Social Services

Introduction

4.1. The social services are usually regarded as those services provided by central and local government for the purpose of maintaining and increasing the welfare of society. These services are for the purposes of this paper taken to consist of education, National Health Service and local authority health and welfare services. This chapter will consider how the planned increase in population in the Central Borders between 1966 and 1981 is likely to affect (1) the supply of the social services, (2) the number of social services staff that will be needed to meet the resulting increase in supply and (3) the ability of existing capital equipment to accommodate this increase in supply.

4.2. In order to assess the supply of the social services in 1981, we shall proceed by (1) assuming that the present standard of service is constant, (2) estimating potential demand on the basis of population projections and (3) modifying these projections to meet the supply constraint as given by the standard of the service. Since demand will always ex-post equal supply, we are in effect estimating supply. Where the standard of the service is expected to improve, appropriate allowances will be made. The requirements for staff and capital equipment will depend on the future supply of the social services and will be assessed on the basis of the estimates of supply in 1981. It should be noted that the Central Borders is not a self-contained region with regard to the social services. In the case of education, for example, higher education facilities are provided outside the region, whilst in the health and welfare services there are examples of overlap and sharing with counties outside the region. With the exception of the general hospital service, the projections of needs in 1981 have been estimated in respect of the Central Borders only. As a result it is not very meaningful to compare the projections with the existing supply of services without making allowance for the population served outside the Central Borders.

Projection of Population

4.3. The degree of accuracy achieved by any set of population projections will depend on the accuracy of the underlying assumptions. As in Chapter Two, the area being considered has been taken as the shires of Peebles, Roxburgh and Selkirk. The projection figures which appear in Table 4.1 below assume that population emigration from the Central Borders will continue at a net rate of five hundred per annum during the period 1966 to 1981,¹ and that the target population increase is achieved by a planned immigration of 25,000 by 1981.

Table 4.1
Projections of Central Borders Population
by Age 1966-1981

Age Group	1966 ²	1971 ³	1981 ⁴
0-4	5.8	5.8	8.9
5-14	10.8	11.1	17.5
15-29	6.3	5.0	7.0
30-34	15.2	14.3	20.3
35-64	29.4	26.8	31.5
65+	11.7	12.1	13.3
All Ages	77.2	75.1	99.5

¹Source: Registrar General for Scotland.

²Source: Projection II in Chapter One.

³Source: Projection II in Chapter One.

⁴Source: Projection II in Chapter One.

4.4. Because of the individual importance of two of the social services, education, and health and welfare, in terms of employment and expenditure, and the overlapping of administrative areas, these services are examined separately.

Education

4.5. Recent trends in education have been characterised by the spread of the comprehensive system of education. Under this system pupils transfer *en bloc* at the age of eleven or twelve from primary school to a junior or senior high school offering a comprehensive range of subjects. The longer term might see a system in which pupils will be able to advance from primary to senior grades without changing schools.

4.6. In a sparsely settled area, such as the Central Borders, a system comprising only 'all through' comprehensive senior schools might be impracticable because of the burden of daily travel which would be imposed, particularly on younger pupils. A maximum of one hour's travelling time with regard to secondary school pupils and a maximum distance travelled of one mile with regard to primary school pupils might be regarded as desirable limits. A form of organisation based on present lines therefore suggests itself, that is, having numerous and scattered primary schools whose pupils transfer *en bloc* at age twelve to prescribed junior⁵ and senior high schools offering a comprehensive range of certificate courses. Pupils of the junior high school who wish to continue their education after the age of fifteen years might, as at present, transfer in their third year to a senior secondary school. It is possible that the range of courses

¹If the objective of the exercise is to reduce net emigration to a minimum, the assumption of the present rate of net emigration of 500 per annum may be regarded as a maximum. An alternative assumption of no net emigration was used in estimating population in 1981, on the grounds that the acquisition and diversification of the industrial structure in the Central Borders is likely to have some impact on the present outflow of emigration. It was found, however, that differences between the two sets of population were marginal.

²Present plans for re-organisation indicate that only one junior secondary school will remain in operation, i.e. at Jedburgh.

taught in the later years of primary schooling will expand to the extent where a two-tier system of primary education is desirable, as suggested by the Scottish Education Department.¹ Such a system envisages first schools for pupils up to ten years and middle schools for ten to fifteen year olds, more centrally located. It is assumed however that such a system will not be developed before 1981.

4.7. In order to assess the educational requirements in the Central Borders up to 1981, the demand-for-places approach will be used. By law all children aged between five and fifteen years are at present required to attend school. If it is assumed that the effects of migration are negligible, that no classes are repeated and that a sufficient supply of places is available, requirements for compulsory education can be estimated by using population projections for the relevant age groups. For other age groups, educational requirements will be influenced by factors additional to that of population age group and estimates will attempt to make allowance for them.

4.8. Assessment of staff requirements will be made on the basis of the demand for places and the standard of service being offered, as indicated by the pupil-teacher ratio. This use of the latter ratio assumes that teacher inputs are at least approximately homogeneous and that the number of teachers needed will never be less than the threshold minimum required to teach a comprehensive range of subjects. The number of new schools required will be dependent upon the standard of service supplied, the degree of excess capacity available in schools at present, and the distribution of the new population, as well as the absolute addition to the relevant age groups in the population.

4.9. The analysis may conveniently be developed by considering separately the various divisions in the educational system i.e. pre-primary, primary and secondary, and further education.

Pre-primary Education

4.10. At present pre-primary education facilities are non-existent in the Central Borders, apart from two privately run crèche units in Hawick and Galashiels. The function of the crèche unit may be said to be to provide supervision of children of pre-school age whose parents are at work rather than to educate them. It may be questioned whether the education

authority should provide nursery school places in order that the female activity rate may rise. The Plowden Report suggests, however, that 'nursery provision on a substantial scale is desirable not only on educational grounds but also for social, health and welfare considerations'.² The Department of Education and Science have stated that 'by 1976, there should be enough teachers for the elimination of over-size classes on present staffing standards, provided they are fairly distributed between the different parts of the educational system'.³ If it is assumed that present staffing standards are maintained and that staff recruitment rates do not fall, it may be assumed that after 1976 resources in the form of staff will be available for employment in nursery schools. The Plowden Report recommends that nursery centres should be set up and that children attending should be divided into groups of twenty. In lieu of a survey by local authority to assess demand, the Report estimates that the number of places needed will be as follows: places will be needed for 50% of the children in the 3-4 years age group, and for 90% of the 4-5 years age group. The major proportion of these places will be part-time amounting to 35% of three-year-olds and 75% of four-year-olds. The full-time equivalent requirement for places is calculated to be 32.5% of three-year-olds and 52.5% of four-year-olds, on the assumption that part-time equals half a day. Staff requirements are estimated at one qualified teacher per sixty full-time places, and one trained nursery assistant per ten full-time places. It is assumed that all nursery school staff will be female. Table 4.11 below shows the relevant projections of demand for places and staff requirements for the Central Borders in 1981 on the assumption that the Plowden Report recommendations are carried out. Because resources are unlikely to be available before 1976, no estimates are made for 1971.

Primary and Secondary Education

4.11. Despite the relatively stable number of day pupils attending primary and secondary schools in the Central Borders (see Table 4.111 below) there has been a persistent fall in the number of schools, the bulk of this decrease taking place in primary schools. This reflects the continuing decline of the rural population and the general trend towards concentration of educational services in urban areas.

¹Recommendation of Secondary Education, SED Circular No. 600 (25.10.1961).
²Children and Their Primary Schools, Vol. One, pp. 116-7, D.E.S. Report (J.L.M.S.D. 1971).
³Education in 1980, D.E.S. Report (J.L.M.S.D. 1971).

Table 4.11
Pre-Primary School Place and Staff Requirements in Central Borders by Age Group in 1981

Age Group	Population in Age Group ¹	Proportion requiring full-time places	Number of full-time places required	Staff Requirements		
				Qualified Teachers	Assistants	Total
3-three-olds	1,980	32.5%	644	11	45	76
4-year-olds	1,980	52.5%	1,040	17	104	121
Total	1,980		1,684	28	149	197

¹Source: Table 4.1. A slight proportion of the 0-4 age group has been calculated.

Table 4. III
Primary and Secondary School Pupils and Staff in the Central Borders, 1955-1965

Year	Total Day Pupils	Number of Schools	Number of Full-time Teachers	Pupil-Teacher Ratio		% Oversize Classes	
				Central Borders	Scotland	Central Borders	Scotland
1955	11,379	88	536	21.1	23.6	3.5	7.6
1960	11,501	85	548	21.0	23.3	3.6	8.0
1965	11,437	73	571	20.1	22.2	2.1	6.2

¹Source: 'Education in Scotland', Annual Reports by S.E.D., H.M.S.O.

4.12. The pupil-teacher ratio may be regarded as reflecting the standard of service being provided. Table 4. III shows that the pupil-teacher ratios were lower in the Central Borders than in Scotland as a whole and that there was a steady improvement in both areas between 1955 and 1965. A further indication of the standard of service is given by the percentage of oversize classes. The lower figure for the percentage of oversize classes in the Central Borders as compared with Scotland might be interpreted as a reflection of the existence of spare capacity in the Central Borders given the lower pupil-teacher ratio in the latter. But oversize classes tend to be found in areas of relatively dense population, and any spare capacity in the Central Borders is likely to be found outside the urban centres. Since the immigrant population will tend to be placed in urban areas, it seems likely that the increased demand for places will have to be provided by additional classes, the majority of which will require to be accommodated in new schools.

4.13. Table 4. IV below contains projections of the school population for ages five to eighteen years. Allowance has been made for the raising of the school leaving age to 16 years in 1970. The rapidly rising number of pupils who are expected to stay on after age 16 is the result of a number of factors, particularly rising per capita income, changing parental attitudes towards education and related to this, the rising educational level of parents. J. Vaizey and R. Knight's projections of school population¹ suggest that the proportion of boys and girls aged 16 years and over enrolling at schools in England and Wales will rise from 12.6% in 1960 to 41.1% in 1975. In the Central Borders in 1966, the proportion of the 16-18 years age group who attended senior secondary school was 10.9%.

This is rather lower than might be expected and may be a reflection of the number of pupils aged over 16 who attend schools outside the Central Borders. Using the Vaizey and Knight ratios as a guide, and allowing for the lower proportion in the Central Borders, it is estimated that the relevant percentage for 1971 will be 20%; if children of immigrants who stay on at school after age 16 enrol at schools in the Central Borders, the percentage for 1981 might rise to 40%.

Table 4. IV indicates that the number of additional places required is in the order of nine thousand, of which 3.9 thousand will be secondary pupils.

4.14. In order to assess staff requirements up to 1981, allowance must be made for likely improvements in the standard of the service. The pupil-teacher ratio is taken to be a measure of the standard of service. The prescribed upper limit to the size of classes for primary and secondary classes are higher in Scotland than in England and Wales. If the scarcity of teachers is overcome by 1976, and if teacher recruitment rates continue at the same average level, it is likely that by 1981, the upper limits in Scotland could be reduced to match those applying in England and Wales; namely, 40 pupils per teacher in primary schools and 30 pupils per teacher in secondary schools. In order to abolish all oversize classes in primary schools, the Plowden Report suggests an average pupil-teacher ratio of 25:1 must be achieved.² Vaizey and Knight propose a ratio of just under 16:1 to achieve the same goal in secondary schools.³ These ratios appear to be marginally higher than the ones prevailing at present in the Central

¹'Education' in (W. Beckmann, ed.), *The British Economy in 1975* (Cambridge 1967).
²Condon Review, Vol. One, p. 321.
³Beckmann, op. cit., p. 403.

Table 4. IV
Demand for Primary and Secondary School Places in the Central Borders by Age Group in 1965, 1971, 1981
(thousands)

Age Group	1965 Pupils ¹	1971		1981	
		Population ²	Pupils	Population ²	Pupils
Primary 5-11 years	7.5	7.8	7.8	12.9	12.9
Secondary 12-15 years	3.9	4.3	4.3	6.0	6.0
16-18 years		3.0	0.6	1.7	1.7
Total	11.4		12.7	4.2	20.6

¹Source: Scottish Educational Statistics 1965; H.M.S.O., 1967.

²Population figures were calculated as a straight proportion of those appearing in Table 4. I.

Borders. However, in view of the pressure on resources of manpower caused by the rising of the school age in 1970, and by the relatively large increase in population by 1981, the same ratios are used for these years in Table 4. V below.

4.15. In order to determine what proportion of the projected needs for staff in 1981 are female, the female-male staff ratio based on those prevailing at present in Scotland were used. In primary schools, the ratio is twelve females to one male, giving a total of 476 females in the 1981 primary school teaching staff. In secondary schools, the ratio is three females to four males, giving a total of 206 females.

centres at Denholm are specialist-oriented in the subjects offered, these reflecting the demand from the two main industrial sectors in the Central Borders, namely, textiles and agriculture.

4.18. The field of further education is immensely complex, there being many different factors influencing the demand for places. First there is the relatively large population increase. Offsetting the effect of this factor to some extent will be the rise in full-time enrolment in non-compulsory secondary education and the expansion of higher education facilities in Central Scotland. Perhaps the most important factors

Table 4. V
Teaching Staff Requirements in the Central Borders by Population Age Group, 1971, 1981

Age Group	1965	1971		1981		
	Staff	Pupils (thousands)	Pupil-Teacher Ratio	Staff	Pupils (thousands)	Pupil-Teacher Ratio
5-11		7.8	25 : 1	312	12.9	25 : 1
12-15		4.3	16 : 1	306	6.0	16 : 1
16-18		0.6		618	1.7	
Total Staff	571					997

4.16. The shortage of qualified teachers has possibly been a greater constraint on the improvement of standards than a limited budget, although the two are not independent of one another.

In an attempt to overcome this problem, the use of teachers' aides has been recommended in the Plowden Report.³ A teacher's aide is a partly trained teacher who will usually be employed on a part-time basis. A ratio of one aide to two infant classes is proposed. It is unlikely because of the scarcity of trained people that this recommendation will be implemented before the late 1970s. In 1981 it is assumed that a total of 258 teachers' aides will be employed to supplement full-time teaching staff in primary schools. It is assumed that all aides will be females.

Further Education

4.17. There are at present three colleges of further education in the Central Borders, two in Galashiels and one in Hawick. There is also a small day-release centre at Denholm. The total number of day students accommodated in 1965 was 745. Two of the colleges, the Scottish Woollen Technical College, Galashiels, and the

will be the introduction of new industry which will tend to employ skilled manpower, and the accompanying rise in per capita income. The effect of these factors can be expected to stimulate demand for semi-professional and trade qualifications, and for further vocational qualifications. The result seems likely to be a rapid increase in the number of places required in further education. The number of students studying in colleges of further education is shown in Table 4. VI to be increasing at an accelerating rate. Under the influence of the factors mentioned above it is assumed that this trend will continue. Between 1965 and 1981, the number of full-time equivalent places required in further education is estimated to increase by 1169. It is assumed that a 12:1 student-teacher ratio will operate,⁴ and that the male-female staff ratio will be 4:1 as at present.

Summary

4.19. It is estimated that the number of places required in pre-primary, primary and secondary classes and in colleges of further education in

³ Plowden Report, Vol. One, p. 330.
⁴ Wickham, *op. cit.*, p. 444.

Table 4. VI
Demand for Places in Further Education in Central Borders 1968-1980

	Places								Staff (full-time equivalent)
	1950	1960	1961	1962	1963	1964	1965	1980	
Number of Students (full-time equivalent)	179	369	514	434	566	600	745	1,914	160

1981 will amount to about 24,200, an increase of 12,000 over 1965. The number of full-time equivalent teachers employed will be 1354, plus 258 part-time teachers' aides. Of the full-time equivalent staff total, 67% is on present proportions likely to be female.

4.20. The demand for higher education seems likely to be satisfied by universities and advanced colleges of technology in Central Scotland. If however the rate of increase of pupils in the 16-18 age group continues after 1981 there may well be a case for siting an advanced college of technology in the Central Borders. Grounds for doing this are (a) the technical expansion of industry and employment in the Central Borders after 1981; (b) the emigration of senior pupils to higher education facilities outside the Central Borders, affording little return in the form of skilled and qualified manpower; (c) the increasing pressure on the capacity of higher education facilities in Central Scotland from a growing population in that area.

Health and Welfare Services

4.21. This section will examine the present organization of the Health and Welfare Services in the Central Borders and the trends and policies which prevail generally. On this basis, projections of place and staff requirements will be made for 1981.

Organisation

4.22. A tripartite division of the administrative machinery exists in the health and welfare services. The parts are not coterminous in geographical area and are said to suffer from haphazard division of function.

4.23. The hospital service operates under regional hospital boards, the Central Borders being part of the South-Eastern Regional Board, which also includes Fife, Edinburgh, the Lothians, and the Eastern Borders. The Board is responsible to the Secretary of State for Scotland for provision of hospital and specialist services.

4.24. Executive Council services comprise general medical, dental, pharmaceutical and certain ophthalmic services. The Executive Council is responsible to the Secretary of State for Scotland. Administrative units in the Central Borders are grouped under two Executive Council management committees which control the areas of the Lothians and Peeblesshire, and Berwick, Roxburgh and Selkirkshires respectively.

4.25. The third division is that of Local Authority services which support and to some extent may overlap the other two. In the Central Borders, they are provided by the County Council and include maternity and child welfare services for physically and mentally handicapped, home nursing, care of the aged and homeless, and the ambulance services. Some of the services are provided jointly by the Local Authorities; health services, for example, are provided jointly by Peebles and Midlothian and certain of the welfare service units include

Peebles and Selkirkshires (Eildon Welfare Home), Roxburgh, Selkirk and Berwickshires (Psychiatric Social Worker).

Trends and Policy

4.26. The fragmentation characterising the system has resulted in problems of co-ordination and control. Because of the variation in the responsibility between the services, the degree of co-ordination and co-operation between the local officers concerned varies. The stated aim in the 1962 'Hospital Plan for Scotland'¹ is that the 'hospital service must be treated as one part only of a comprehensive health service', and, in the 1966 'Review of the Hospital Plan'² the government regard themselves as being 'firmly of the view that the corollary of the plans for the major hospitals . . . is the provision in local communities wherever possible of improved and integral local health services'. This has been taken by some to imply that effective operation requires the setting up of a common authority on a regional basis which will cut across the line form of organisation prevailing in the hospitals. It is here assumed that this system will be in operation in 1981.

4.27. Changes in the demand for health and welfare services are taken to be determined by the rate of population growth and the changing age structure of the population. Modifying factors are the rate of medical and sociological advance; the effects of rising income and changing distribution of income, and the extent of present unsatisfied demand, but development must basically be planned against the background of population trends, particularly in the age group 0-2, and in the over 65s group.

Table 4. VII
Population Projections in Central Borders, 1961, 1971, 1981

	(thousands)		
Total	1961 ^a	1971 ^b	1981 ^c
0-2	78.4	75.1	99.5
65+	3.5	3.5	5.9
	11.6	12.1	13.3

^aSource: Population Census 1961.
^bSource: Table 4. I; the 0-2 age group was taken as a straight proportion of the 0-4 age group in Table 4. I.

The whole population may be regarded as being at risk for acute and mental illness, whilst for elderly and mentally deficient cases, a more restricted population group is used for estimating demand. A point of note in Table 4. VII is the growing size of the over 65 age group.

General Hospitals

4.28. The trend in cases of acute illness has been towards shorter stays, resulting from more intensive treatment, more effective drugs, and more elaborate equipment. The provision of a full range of hospital services is said to require units with a minimum of two hundred beds (Paige and Jones).³ Of thirteen hospitals (excluding Dingleton) in the Central Borders only one has more than fifty beds, namely, Peel

¹'Hospital Plan for Scotland', Cmd. 1802 (H.M.S.O. 1962).

²'Review of the Hospital Plan for Scotland', Cmd. 2817 (H.M.S.O. 1966).

³Health and Welfare in Rockingham, op. cit.

Hospital near Galashiels. The policy of the Scottish Home and Health Department is that treatment of acute illness outside the main regional centre (i.e. Edinburgh) will increasingly be centred on a series of large district general hospitals catering for acute, maternity and psychiatric cases. Long term treatment of the elderly will tend to be carried out in the smaller cottage hospitals. Peel Hospital is the obvious choice for district general hospital in the Central Borders, but the existing building, largely wartime Nissen huts, is inadequate by present standards, and its reconstruction is planned. Choice of site will tend to be determined by population distribution, supply of transport facilities, and length of travelling time required by patients, their relatives and G.P.s to reach it. Given an efficient transport system and assuming the desirability of travelling is directly related to the amount of time spent travelling, the site which suggests itself is Galashiels.¹

Community Care

4.29. The purpose of the Health and Welfare services is preventative, i.e. to avoid or postpone the need for residential care. The emphasis, therefore, is on care within the community. It is understood that this will require a big expansion in domiciliary services. The trend is towards provision of care in small units, not only for social and humanitarian reasons, but also because greater flexibility is gained in meeting changes in methods of treatment.

4.30. In considering maternity needs, the general trend for fewer births to take place in the home must be taken into account. In Selkirkshire, of 369 live births in 1962, six were domiciliary.² In Peeblesshire, of 230 live births in 1965, two were home confinements. This compares with 26 home confinements in 1954,³ and reflects a trend operating nationally. The Review of the Hospital Plan states that 'the specialist maternity unit will almost invariably be provided as part of a large general hospital', in the form of G.P. maternity units.⁴ This is assumed to be so in the case of the new District General Hospital.

General Medical Facilities

4.31. The present shortage of doctors is likely to continue, at least until 1970, because of the long training period involved. The average number of patients per G.P. in the Central Borders in 1966 was a little over 1800. Paige and Jones estimate that the average number of patients per G.P. in Great Britain will fall to 1775 in 1980 from 2047 in 1962, allowing a maximum list of 2500, instead of the present maximum of 3500.⁵ If the ratio of 1775:1 is proportionately reduced in order to apply it to the Central Borders a ratio of 1566:1 is obtained.

4.32. The Command Paper 'Health and Welfare: The Development of Community Care' (1966) indicates that 'the future pattern of general practice will increasingly be a pattern of doctors working in groups from shared premises with full supporting help'.⁶ This

trend is already markedly apparent in the Central Borders, there being only two G.P.s out of 37 in Roxburgh and Selkirkshire not in partnership.

4.33. It seems possible that there may be a change over to health centres by 1981. On the basis of a patient/G.P. ratio of 1566:1 in 1981, and a total population size in the Central Borders of 99,500, and assuming that the average size of a health centre in terms of the numbers of G.P.s is ten, it is estimated that six or seven health centres would be required in 1981. Four of these might be attached to or located in existing cottage hospitals in Hawick, Jedburgh, St Boswells, and Selkirk and two in Peebles and Galashiels, respectively. Provision of health centres will obviate the need for maternity and child welfare clinics. In 1966, there were 16 clinics operating in the Central Borders, of which four were purpose built. It is assumed that these will be incorporated into health centres by 1981.

Projections: I. Demand for Places

4.34. The assessment of demand for places is based on the population which is expected to be resident in the Central Borders in 1981. However, in 1965, the Central Borders General Hospital Service catered for a large part of the population in Berwickshire, and it is expected that this provision will continue in future. This means that estimates of future general hospital requirements made below cannot meaningfully be compared with the existing service unless an addition approximating to the population in the Eastern Borders, who will receive hospital treatment in the Central Borders, is made to the projected Central Borders population. The 1961 population of Berwickshire was 22,437. If, for simplicity, it is assumed that this population does not change in size before 1981, and an allowance for the people on the east coast of Berwickshire, who use the Edinburgh or the Berwick hospital service, of about four thousand is made, this total may be modified to 18,500, and used for assessing bed and staff requirements in the General Hospital in the Central Borders. Assessment of requirements for mental illness and geriatric treatment do not make this allowance.

General Hospital

4.35. The bed ratios used for assessing Hospital Bed requirements in Table 4.VIII below are based on those recommended in the 1962 Hospital Plan for Scotland and its 1966 Review.⁷ In the case of acute illness, the ratio of 3.0 beds per one thousand population is based on Paige and Jones suggestion of a 3.21 bed ratio,⁸ modified in view of the rather lower ratio of 2.3 proposed in the Hospital Plan Review. The

¹See Appendix 1 for details of profile of determining site.
²George M.O.H. Annual Report (Berwickshire 1962).

³Id. O.H. Annual Report (Peebles County 1965).

⁴Cmd. 2871, p. 16.

⁵Stokess, *op. cit.*, pp. 440-1.

⁶Cmd. 1921, p. 2.

⁷Cmd. 1462 (H.M.S.O. 1962); Cmd. 2877 (H.M.S.O. 1966).

⁸Stokess, *op. cit.*, p. 432.

Table 4. VIII
Hospital Bed requirements in Central Borders (1981)

Type of Bed	Bed Ratios	Relevant 1981 Population (thousands)	No. of beds required in 1981	Percent Non (1966) of Beds
Acute	3.0 per one thousand population	118.0 ^a	354	305 ^a
Maternity	10 beds per one thousand births ^b	2.56 ^a	26	
Mental illness	3.7 per one thousand population	99.5	369	530 ^a
Geriatric	15 beds per one thousand population over 65	13.5	200	32
Total			949	1,067

^a Assume birth rate of 27/1,000.

^b Includes voluntary hospitals.

^c Scottish Home and Health Department.

^d Includes allowance for Berwickshire population.

^e This figure includes some geriatric beds.

ratio in respect of Mental illness is based on the 1961 Scottish South Eastern Region ratio of beds per one thousand population and does not include place requirements for mentally deficient.

4.36. If mental illness is excluded from the totals in Table 4. VIII, it can be seen that the number of beds needed in 1981 is only slightly more than those presently existing, namely, 580 and 537 respectively. However the placing of these beds will have changed. The 505 beds in general hospitals in 1966 were used not only for acute and chronic illness, but also for geriatric and maternity needs. In 1981 the district general hospital will probably house only acute, chronic and maternity cases. Long term geriatric care may be given in small rural and cottage hospitals. The drop in the number of beds required for mental illness is accounted for partly because, with increasing emphasis on rehabilitation services, mentally deficient persons who hitherto would have gone to Dingleton or one of the two private hospitals in Hawick and Melrose are assumed to live in the community. It is assumed that infectious diseases and T.B., the incidence of which will continue to fall, will be treated in the central regional hospital.

Mental Deficiency

4.37. The majority of those in need of the services are in one of three groups.

4.38(1). Children of school age needing training to minimise their handicap: At present mentally handicapped and physically handicapped children are given training in the same centres, i.e. a private boarding school (Dolphinton), four special classes attached to schools, and a junior occupational centre in Hawick. For residential care, there are two children's homes, and a private mental defective institution for

girls, with a total complement for the three of 144 beds.

4.39(2). Young retarded adults and (3) severely retarded adults: The latter will be cared for residentially, and the former will be cared for in the community, living in hostels and attending Senior Occupational Centres. At present there are six occupational centres with 67 places, plus classes for mentally and physically handicapped persons at Eldon Welfare Home. Table 4. IX below shows the estimated requirements for places in training centres and hostels by sub-normal persons.

4.40. The main increase in requirements will be for places in the junior training centre. The low number of hostel places required seems impracticable and unrealistic, and it is assumed that existing facilities continue to operate.

Care of the Aged and Handicapped

4.41. Most of the persons in institutions are single, widowed or divorced. The continuing break-up of the family means that the number of places required in old peoples homes in 1981 will tend to increase, although offsetting this to some extent will be the higher proportion of old people who are married. However much of the current demand arises from poverty, poor housing and lack of domiciliary facilities. Higher pensions, group unit housing and more domiciliary services are assumed to exist in 1981. As a result, the figures in Table 4. X show that residential places required fall from the absolute level of 1966, whilst special housing facilities increase rapidly.

No distinction is made between public and private homes in Table 4. X below, although rising income will tend to increase the demand for private care.

Table 4. IX
Place Requirements for Mentally Deficient Persons^a in Central Borders by Type of Facility 1971, 1981

Type of Facility	1971		1981	
	Ratio: places per one thousand population ^b	Places	Ratio: places per one thousand population ^b	Places
Adult: Training Centre	0.59	44	0.65	65
Hostel	0.14	11	0.17	17
Junior: Training Centre	0.54	41	0.54	54
Hostel	0.04	3	0.05	5

^a Places for physically handicapped are allowed for below.
^b Source: Census Paper 5021, p. 412.

Table 4. X
Demand for Places by Elderly and Handicapped in Central Borders by
Type of Facility 1966, 1971, 1981

Type of Facility	1966	Ratio per one thousand population over 65 ^a	1971	Ratio per one thousand population over 65 ^a	1981
	Places ^b		Places		Places
Old Peoples Homes:					
Public	210	20.2	244	21.7	289
Private	94				
Special Housing (e.g. group units)	35	24.6	286	25.0	386
Total	340		542		675

^aSource: Scottish Home and Health Department.
^bSource: Census, Paper 1021, p. 412.

Table 4. XI
Hospital Staff Requirements (excluding Nurses and Attendant Staff)
in the Central Borders 1966, 1981

	1966 ^a number	Number of staff required in 1981
Consultants	21.2	29
Domestic ^b	227	264
Other ^c	73	121

Table 4. XII
Nursing and Attendant Staff Requirements in the Central Borders 1966, 1981

Year	General Hospital	Hospital and Homes for Mentally Ill and Deficient	Welfare Homes and Special Housing	Training Centres	Total
1966 ^a	256	153	126 ^b	—	535
1981 ^a	363	160	197	34	934

^aSource: Scottish Home and Health Department.

^bApproximate figure. No figures were available for private institutions and the ratio (provided in public institutions) was applied.

^cThe method of estimating the 1981 requirements for domestic and other staff was to allow proportionately for the increase in hospital places and to percentages of those the expected increase in domestic and other staff resulting from improved place-staff standards based on estimates made by Page and Jones in *Rehman et al. The British Economy in 1975*, pp. 447-8.

^aThe method of estimation was to calculate the percentage improvement in the staff-patient ratios proposed by Page and Jones in *The British Economy in 1975*, p. 444, to improve the presently prevailing place-staff ratios by the same proportion and to apply the improved place-staff ratios to the place requirements assumed above for 1981.

Projections : 2. Staff Requirements

Hospital Service

4.42. The number of consultant doctors practising in Scotland increased at an average rate of 3½% p.a. between 1948 and 1960. Since the needs of the district hospitals are unlikely to be as great as those of the regional centre hospitals, a growth rate of 2% p.a. has been assumed for the Central Borders. It is also arbitrarily assumed that, on average, the ratio of part-time to full-time equivalent staff is 1:5. The greater intensity of nursing treatment will require more staff. Increased productivity in the form of shorter stays by patients and more intensive treatment will put increasing pressure on nursing staff. Shorter hours and improved working conditions are assumed. As a result, the staff-patient ratio is expected to gradually improve. This applies also to mental illness. The increasing use of smaller units in the care of the elderly and handicapped will require more staff. In order to satisfy this need, and to relieve the present shortage, indicated by waiting lists, for places in homes, the staff-patient ratio is again assumed to fall. Tables 4. XI and 4. XII above show estimated staff requirements in the Central Borders in 1981.

4.43. The apparent drop in staff required in the group 'hospital and homes for mentally ill and deficient' is due partly to the fact that no allowance has been made for the demand for places arising outside the Central Borders and partly to the expected dramatic fall in the bed ratio for mental illness as a result of shorter stays and the development of community care.

Executive Council Services

4.44. The demand for G.P.s estimated in Table 4. XIII below is based on a population ratio of 1566 to each G.P. No allowance has been made for auxiliary staff. In the case of dentists, it is assumed that there will be a fairly rapid rise in the rate of recruitment, permitting a population ratio of 2500/1 by 1981. This ratio is based on an estimate made by Page and Jones.¹

Table 4. XIII
Requirements for G.P.s and Dentists in the Central Borders 1967, 1981

	1967 (January)	1981
G.P.	44	64
Dentist	16	40

Source: Pugh and Roshburgh, Berrick and Schick, Executive Councils.

¹Berrick, pp. 461-2 (Table 4.13).

Local Authority Services

4.45. Many of the local authority services are new and expanding rapidly. Estimates of staff requirements are based on ratios of staff to population given in 'Health, and Welfare: The Development of Community Care'¹ and by Paige and Jones.² The figures in Table 4. XIV below are given in terms of full-time equivalents. It should be noted that the estimates in Table 4. XIV may understate actual needs since they do not take account of population presently provided for outside the Central Borders.

4.46. Total requirements for health and welfare services in the Central Borders are summarised in Table 4. XV below. Of the 1594 staff required in 1981, 1066 are estimated to be female.

Conclusion

4.47. A chain is held to be as strong as its weakest link. Similarly any chain of reasoning will suffer from weaknesses in the explicit and implicit assumptions underlying it. In the foregoing analysis, a fundamental assumption is made about the size and structure of the future population. Any changes here will obviously alter the results of the analysis. In addition, in certain of the estimates of demand for places and for staff, ratios are used which implicitly assume that the social services in the Central Borders will conform to the national pattern in

1981. It is accordingly difficult to accept the results as being more than guidelines.

4.48. The study of the social services in the Central Borders and the effect of the planned increase in population indicates that the number of pre-primary, primary and secondary, and further education places in 1981 might come to over twenty-four thousand, just over double the number in 1966. This is a larger proportional increase than takes place in the population. The number of full-time equivalent staff required to satisfy the assumed increase in demand amounts to 1354, plus 258 teacher's aides. Of the combined total, 1169 are likely to be female.

4.49. The fragmented tripartite structure of the Health and Welfare Services is assumed by 1981 to be superseded by an integrated service under a single authority. Under such a system, the Central Borders will form part of a region administered by the single authority. Because the Central Borders seem likely to form only part of a regional service, the size of which could only be guessed at, the projections of demand for places, with the exception of acute and maternity hospital beds and hospital nursing staff, is made without allowance for the supply of the service to places outwith the Borders. Because of this, comparison of the projected requirements with those presently being met cannot meaningfully be made.

¹Green 1972, p. 413.
²Rockman, op. cit., p. 442.

Table 4. XIV
Local Authority Health and Welfare Staff Requirements in the Central Borders, 1966, 1981

Type	Number 1966 ¹	Ratio per one thousand population	Number of staff required
Social Workers	1 ¹	0.12	12
Psychiatric Social Worker		0.02	2
Welfare Assistants	37	0.17	17
Health Visitors		0.23	23
Home Nurses		—	—
Midwives		0.03	3
Other Nurses	65	0.45	85
Home Helps			142
Total	103		

¹Source: Scottish Home and Health Department.

²The Psychiatric Social Worker is shared with Fife Council.

Table 4. XV
Summary of Requirements for Health and Welfare Services in the Central Borders, 1966, 1981

Year	Hospital	Beds/Floors Welfare Homes (incl. children)	Places in Training	Staff
1966	1,087	484	67	1,019.2
1981	739	697	119	1,594

Appendix A

Choice of Site for the District General Hospital

4.51. The function of a District General Hospital is to serve the community within which it is sited. In choosing a site, therefore, the overriding factors will be those which influence the costs and benefits to the community receiving the service. Other things being equal, it can be assumed that no matter which site is chosen the benefits of the service will be generally the same.¹ The siting decision must therefore be based on factors affecting the costs involved.

4.52. The capital costs of building a new hospital will tend to differ only marginally between different sites, if it is assumed that the potential site will be placed in one of the urban centres. The building costs may therefore be taken as given. The decision must then rest on the relative social costs attaching to each site. If it is assumed that each individual in the community is a potential consumer of the hospital service, whether as a patient or a visitor, the ideal site for each individual would presumably be in or adjacent to his own home. This being out of the question for every individual, it may be argued that the cost of having the district hospital sited away from home is the disutility of having to travel from home to the hospital to receive treatment or to visit a friend. The disutility for each person is taken to be a function of the amount of time spent in travelling, which in turn is a function of distance travelled.

4.53. If it is assumed for simplicity that the time-distance ratio is the same for all roads in the area, that the disutility function is linear, and that it is the same for each individual, it becomes possible to calculate a disutility factor for each site. The disutility factor may be defined as the sum of the products of each individual resident in the Central Borders, and the distance of each individual from the potential site. The object of the exercise is to ascertain which site offers the minimum disutility to the community. In other words, the site chosen will be the one possessing the lowest disutility factor

(D.F.). Because of the impracticability of calculating a D.F. for each individual, the simplifying assumption is made that the distribution of population in the urban centres reflects the distribution of population in the whole of the Central Borders. On this basis the D.F. becomes the product of the population resident in the urban centres and the distance by road of the urban centres from the site under consideration.

4.54. It is expected that the new District General Hospital will continue to serve the major part of Berwickshire and accordingly, in calculating distances between urban centres and possible sites, the urban centres Coldstream, Duns and Greenlaw are included. The villages on the east coast are served by the General Hospital in Edinburgh or Berwick, and are therefore ignored.

4.55. Table 4, XVI below gives the D.F.s for sites with the lowest D.F.s.² If a decision as to choice of site is based on social cost, it is clear that Galashiels will provide the site, since it has the lowest D.F. of the four sites.

4.56. It must be admitted that the disutility of travel by the majority of the population in the area is a rather crude measure of, and by no means the only component of social cost. It can also be argued that the individual disutility function is not linear. It may, for example, be discontinuous, reflecting threshold barriers between which the disutility is zero. If, however, it is accepted that the D.F. calcu-

¹The model being used here is essentially a gravity model similar to the one used in Chapters Six and Seven. The assumption of benefits being the same for each site is only one of various utility functions which could be used. The disutility function may be regarded as a negative utility function. The utility function involves factors such as the gravity value of each site which will depend on individual preferences. Since objective evaluation of subjective factors cannot be made a constant value in respect of each site has been assumed for each factor.

²Midrose, in fact, has a lower D.F. than Kelso, but the D.F. is rather higher than for the other three, being equal to 1846. Removal of the advantage for Berwickshire, it was assumed that Kelso might offer a more interesting example.

Table 4. XVI

Urban Centres	1980 ³ Population Weight	Site							
		Galashiels		St. Boswells		Kelso		Selkirk	
		Distance	Product	Distance	Product	Distance	Product	Distance	Product
Coldstream . . .	1.2	27	33	19	23	9	11	28	34
Duns . . .	1.8	31	56	23	42	16	29	32	58
Greenlaw . . .	0.8	24	19	16	12	23	18	27	19
Kelso . . .	3.9	18	70	10	39	—	—	18	74
Galashiels . . .	18.0	—	—	8	144	18	323	6	108
Berwick . . .	17.6	18	316	19	334	21	369	13	211
St. Boswells . . .	12.2	8	97	—	—	10	122	9	110
Edinburgh . . .	1.7	13	22	5	8	15	25	14	23
Dumfries . . .	4.0	2	8	6	24	16	64	8	32
Midrose . . .	2.6	4	11	4	11	14	37	10	26
Edinburgh . . .	5.0	17	86	9	45	11	55	18	91
Selkirk . . .	6.6	6	40	9	60	19	126	—	—
Inverlathen . . .	2.4	12	29	20	49	30	73	15	37
Peebles . . .	6.3	20	126	28	176	38	239	23	145
D.F.			913		957		1,691		867

³Source: Planning Research Unit, University of Edinburgh.

Table 4. XVII

Urban Centre	1980 ¹ Population Weight	Site							
		Galashiels		St. Boswells		Kelso		Selkirk	
		Distance	Product	Distance	Product	Distance	Product	Distance	Product
Coldstream	1.2	25.0	30	19.0	23	9.0	11	28.0	34
Duns	1.8	27.75	50	21.75	39	16.0	29	30.75	55
Greenlaw	0.8	20.75	17	14.75	12	23.0	18	23.75	19
Kelso	3.9	16.0	62	10.0	39	—	—	19.0	74
Galashiels	18.0	—	—	6.0	108	16.0	208	6.0	108
Hawick	17.6	17.0	299	19.0	334	21.0	570	11.0	194
St. Boswells	12.2	6.0	73	—	—	16.0	122	8.0	98
Barnton	1.7	10.5	18	4.5	8	17.75	27	16.5	28
Durrieck	4.0	3.0	12	7.0	12	14.5	38	9.0	36
Melrose	2.6	3.75	10	2.25	6	13.0	34	9.75	25
Jedburgh	5.0	12.0	60	6.0	30	10.5	53	14.0	70
Selkirk	6.6	6.0	40	8.0	53	19.0	125	—	—
Innerleithen	2.4	12.0	30	18.0	45	28.0	67	14.0	35
Peebles	6.3	19.0	120	25.0	158	36.0	227	23.0	132
D.F.			821		867		1,425		908

¹Monsey Planning Research Unit, University of Edinburgh.

ated above forms the major part of the social cost involved and that the method of calculation is the most convenient in a practical sense, it seems reasonable to use it as a basis for decision-making in this context.

4.57. There is a modification which should perhaps be made to the table in view of the fact that certain of the roads in the Central Borders will be improved by 1980. Because of the higher speeds attainable on the improved roads, the time taken to travel a given distance will be reduced. If it is arbitrarily assumed that there is a 25% saving of time by travelling on the improved road, allowance may be made in the calculation of the D.F. for each site by reducing the distances of improved roadway between urban centres and possible sites by a similar proportion. The roadways which are assumed to be improved are the stretches between Galashiels and St. Boswells and the A.68 between Jedburgh and Earlston. Table 4.XVII shows the modified disutility factors for the four sites. The results indicate that Galashiels remains a clear choice as site, although the relative position of St. Boswells has improved, the margin between the D.F.s in respect of Galashiels and St. Boswells being less in Table 4.XVII than Table 4.XVI.

4.58. A further factor which may influence the

choice of site is the need for a fast connection between the new hospital and Edinburgh, the South Eastern Regional Hospital Board Centre, which supplies the specialist hospital services for the region. The obvious connection is the railway line running through St. Boswells, in view of the fact that the road link is regularly blocked in winter. Galashiels will be connected to both the railway and the A.68 by an eight mile long, improved road surface, and these should provide satisfactory connections with Edinburgh.

4.59. Any change in the relative distribution of population after 1980 should also be considered. There is, for example, the possibility of a population build-up at St. Boswells. Other things being equal, it would require a further increase in the population of St. Boswells of about eight thousand people before the gap between the D.F. for Galashiels and that for St. Boswells in Table 4.XVII disappeared. For the D.F. in respect of St. Boswells, to have a significant advantage over that of Galashiels would require a post-1980 population build up of something more than eight thousand, if allowance is to be made for growth, in areas other than St. Boswells. Whether this will take place within the life span of the new hospital is a question which cannot be answered here.

The Construction Industry

Introduction

5.1. Any expansion in the Central Borders must be largely dependent on the ability of this industry to satisfy the demand to be made upon it. At present some 2500 operatives are employed, spread amongst a number of small firms. Under-capitalisation is prevalent and the level of output and employment has tended to fluctuate. A major cause of disturbance has been a limited and variable market allied to an unpredictable climate which, on occasion, can shorten the effective building season appreciably. Although local aggregates are plentiful, other building materials and fittings have to be brought into the area and delays with additional cost can occur (but probably no more than those suffered by small firms generally in non-urban areas). Despite these difficulties the industry has a reputation for good quality, though unimaginative, building. Resources, particularly with regard to skilled labour, are enough to meet current demand under favourable conditions but are insufficient to step up output appreciably when delays have occurred as a result of weather or delivery bottlenecks. In general productivity has been rising in line with the national average. From this brief introductory survey it is apparent that capacity in the industry will have to be increased in order to meet the housing needs postulated by the rise in population by 1980. What follows relates the estimated growth in the labour force required to produce an annual rate of housing completions large enough to meet this target. Primary consideration will be given to the potential demand for housing by public authorities, with a separate treatment of the contribution to be expected from private house-building.

Local Authority Building

5.2. When setting a programme for future employment in the construction industry there are three conditions to be met:

- (1) The labour force must be large enough to meet all commitments *as they arise* and to offset expeditiously the effects on production of adverse weather and unforeseen contingencies.
- (2) The labour force must not be so large as to present a major problem in redeployment once planned expansion in house building has been achieved.
- (3) The numbers employed will depend on the degree of concentration in the building programme. If employed initially in the Galashiels complex and then, in turn, on other major locations, labour requirements would not differ

appreciably from those required for the initial projected Darnick development. On the other hand if work proceeded, as seems logical, in at least three centres simultaneously, e.g. Galashiels, St. Boswells, and Hawick, then more labour would be required for infrastructure.

With these constraints in mind, and with the realisation that large scale recruitment of skilled labour may prove difficult, the projections given in Table 5.1 were drawn up. In the event they must be considered as the minimum requirements to achieve the population target (see Table 5.1).

5.3. From past trends, and stimulated by the advantages offered by a continuous large scale building programme, the existing industry as it stands has a potential capacity of 400-450 houses per annum. At this capacity it would be fully stretched with no reserve available. To achieve the 100,000 target population and to house some of the existing population, output would have to rise to 500 units per annum and for this a labour force of not less than 3500 would be desirable—an increase of 1000 on present levels of employment. Of these, 2500 might be employed in actual construction, and 1000 in servicing existing property or creating the necessary infrastructure for the new estates. It should be noted that in the Central Borders, up to now, servicing and private house-building have been highly interchangeable—with labour being switched from one to the other as demand dictated. The suggested build-up of the labour force might be in two stages. From 1968-70 there would be a 5% per annum increase brought about by local authority and S.S.H.A. building in the area, plus some of the preliminary infrastructure work for the expansion programme. To this would be added, in 1970, a number of skilled building immigrants for whom not less than 50 of the houses scheduled could be made available. The second phase from 1970-71 entails a jump of 500 in the labour force deployed. Tentatively this might be made up of 100 from growth in the industry (=5% p.a.), 150 from immigration, and 150 new trainees for the industry. Depending on facilities available, the accession of labour from this source could be brought forward. By 1971 the industry should be stabilised at 3500 employees—the minimum level needed to meet the initial commitments and, through rising productivity, provide some surplus capacity for factory and public building after 1971. It is emphasised that stability of the labour force is essential, with natural wastage equal to planned recruitment. The employment level of 3500 is likely to be in excess of housing

Table 5.1
Central Borders Construction Industry
Projected output and employment 1968-1981

	Public Authorities Houses completed	Net additions to population based ¹	Projected Employment ² Infrastructure and servicing	Productivity Factor ³	Houses completed	Private Building ⁴ Occupancy
Phase I						
1968	330 (net)	—	1,750	—	—	—
1969	440	250	2,850	—	100	245
1970	500	1,250	3,100	—	100	259
1971	500	1,500	2,500	—	100	250
					105	255
Phase II						
1972	500	1,800	2,500	—	—	—
1973	500	1,800	2,500	—	140	350
1974	500	1,800	2,500	—	140	350
1975	500	1,800	2,500	200	145	350
1976	500	1,800	2,500	—	145	365
					145	365
Phase III						
1977	500	1,800	2,500	—	150	375
1978	500	1,800	2,500	—	150	375
1979	500	1,800	2,500	—	150	375
1980	500	1,800	2,500	200	155	385
1981	500	1,800	2,500	—	160	400
					160	400
Total	6,810	21,000			1,900	4,735

Numbers accommodated (figures not rounded)

	Public	Private	Total
Phase 1	3,000	1,000	4,000
Phase 2	9,000	2,000	11,000
Phase 3	9,000	1,835	10,835
	21,000	4,735	25,735

¹This figure includes housing the net increase in population as well as increasing some of the existing population.
²Government also provide public provision for private housing.
³See Appendix, Labour Force partly from outside Central Borders area.
⁴Estimated labour available for public works at the end of increased development.

requirements after 1980 and, lacking information as to projected public works, some phasing out of labour has been incorporated. Thus, if after 1980 the only demand to be met was that of local authority housing at less than 400 units per annum, plus private building, a labour force of 3250 would suffice. This could be achieved by slowing down recruitment. Failing this, an equilibrium of 3500 would apply.

5.4. No specific provision has been made for new factories, public building other than housing, or privately-built houses. The volume of factory building required is an unknown factor at present but is not likely to be large up to 1971. Infrastructure for new housing will, in general, also serve industrial estates and with pre-fabrication the provision of factories should not make any significant demand on the labour available. Similarly, with private housebuilding, the existing servicing component, plus resources brought in by speculative builders from outside the Central Borders, already provide 100 houses a year. With the projected 250 more employed in servicing, and with the likelihood of increased activity in the area by outside builders, the rising demand for private houses to 1980 should be met. There remains the question of public building other than housing. Over the period, productivity in the industry should continue to rise by 3% per annum with a considerable reduction in man-hours per house. It is difficult to translate such savings into men available for transfer to public building, but a fair, but probably conservative, estimate would be 400 over the period 1971-80. This is probably an under-estimate. However, if substantial investment in schools, offices, or hospitals is intended either the estimated labour force would have to be increased with a serious problem of absorbing surplus labour needing absorption after the projects were completed, or national contractors should be called in.² The latter course

might prove less disruptive and would lessen the strain on the resources of the Western Borders construction industry. In all the foregoing it has been assumed that there will be no change in the industry's organisation or its capital structure.

The Demand for privately-built houses

5.5. In common with the rest of Scotland, the incidence of private ownership of houses is markedly below that prevailing in the UK as a whole and the South of England in particular. The reasons for this are largely historical with economic and political overtones. As a result, any change in attitude towards privately-owned housing is likely to be slow in emerging. There are several distinctive features to be noted about housing in the Central Border region. At first sight it would appear that the propensity to own houses is somewhat higher than in the rest of Scotland.

From Table 5.11 it can be seen that the housing stock is evenly divided between Local Authority, privately-owned and privately rented. These figures reflect the history of the region rather than current trends in housing. Between 1920 and 1939 there was little growth in local authority housing and the stock of privately constructed 'tid' agricultural and textile company houses remained important. Since 1945 there has been a significant expansion in the local authority sector, a continuing decline in the privately rented, and a very small addition to the numbers of privately built houses available.

5.6. If developments since 1945 are considered, a different picture emerges. From 1945-65 the ratio of annual private building to annual local authority building has averaged only 15.3% for

² To allow for this factor of demand for the services of the construction industry, an increase of 115 to 3,615 in the labour force in the construction industry by 1980 has been assumed for Chapter Three.

Table 5.11
Tenure of Houses

	Owner occupied		Local Authority		Other rented	
	No.	%	No.	%	No.	%
Peebles	1,650	15.9	1,289	14.0	1,659	36.0
Rothesburgh	3,866	27.5	4,710	33.5	5,076	36.0
Selkirk	2,138	22.3	1,883	26.8	2,946	40.9
Galashiels, Peebles	5,080	30.0	5,000	30.0	6,826	40.0
Hawick, Jedburgh	2,433	25.0	2,918	30.0	4,378	45.0

Notes to Table 5.1

Any projection is no more credible than the assumptions behind it. In this case the increase in population, on which labour supply also depends, is held to come from two sources—net population growth and net immigration. These have been exhaustively analysed elsewhere. However, the occupants for the new housing will come from three streams.

- (1) Growth in the existing population; they have been assumed to be housed at a constant occupancy rate of 3. From population trends this may under-estimate accessions to 1975 with an over-estimation thereafter. These will probably cancel out by 1980.

- (2) Incomers from outside the Central Borders area. From experience gained in New Towns they have been assigned an occupancy rate of 3.8.

- (3) For privately built housing a low occupancy rate of 2.5 has been assumed on a constant basis. This anticipates a continued demand from older people. If industrial growth should increase then this occupancy rate might rise with more executives, junior management, and highly-skilled factory operatives in the labour force.

- (4) The size of the building force required is based on the average number of man-years to build public authority house as shown in the official statistics.

Table 5. III
Annual Building Rates

	Average							
	1945-1946		1946-5		1946-6		In Progress 30.9.1947	
	L.A.	Private	L.A.	Private	L.A.	Private	L.A.	Private
Glasgow	50	4	114	6	16	24	27	31
Melrose	4	2-5	0	1	—	16	34	26
Selkirk	15	2	11	6	102	4	33	19
Roxburgh	89	11	2	10	24	30	12	30
Selkirkshire	3	2-5	9	2	—	—	12	23
Sub-total	111	23	127	25	147	64	162	129
Hawick	72	3	137	7	120	32	158	15
Jedburgh	34	1	0	1	12	—	4	4
Peebles (plus County)	12	6	0	9	28	7	—	17
TOTAL	209	33	264	42	307	93	324	169
	24		308		400		489	

Ratio 1945-46	Private Building Local Authority	C. Borders 15.3%	England/Wales 80%	Scotland 17%
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Table 5. IV
Income structure by source (before tax) 1946-5

	Profits and Professional	Employment	Net Investment
Berwick, East Lothian	11%	64%	14%
Roxburgh, Selkirk, Peebles	—	—	—
Scotland	8.4%	70%	7.8%
England	7%	76%	8%

the Central Borders. Even this rate has shown wide variations from year to year and from one locality to another. Roxburgh, Selkirkshire, and Peebles show a ratio of private building to local authority construction approximating to the English pattern. The two large burghs of Glasgow and Hawick have had ratios of under 10%. While this may indicate a deficiency of private demand, it also reflects the determination of the local authorities concerned to fulfil their statutory obligations to improve over-crowded and sub-standard housing conditions in these areas. In so doing it would appear that there has been discouragement of private house building on the grounds that it abstracted resources which could be put to better social use. Of the other burghs, Melrose is unique in that the volume of private housing has consistently exceeded that of the local authority. These variations are likely to have a distinct effect on future demand.

5.7. Back to any estimate of future demand for private housing is the pattern of income distribution. Ideally this should also be considered in association with the ownership of claims to wealth. For this forecast the latter can be ignored since its significance is outweighed by the general level of earned income prevailing in the area. As soon as income distribution is considered, the economic reasons for the weak demand for private housing becomes apparent.

5.8. The Border area draws proportionately more of its revenue from Profits and Professional earnings (11% of incomes) and Net Investment (14% of incomes) than is the case in the rest of

Scotland and England. As a result only 64% of incomes are derived from employment (schedule E) as against 70% for Scotland as a whole and 76% for England.

5.9 The clear deduction from these figures is that most of the demand has derived from professional incomes, senior citizens on retirement, and—possibly—a few business men commuting to urban areas. This finding accords with that of a Survey conducted by the Co-operative Permanent Building Society which found 60% of house buyers in Scotland came from salaried classes compared with 46% in England and Wales.

Table 5. V
Salaried house purchasers 1946

	U.K.	Scotland
Management Administration	7.5%	11.4%
Commerce	13.9	16.2
Clerical	7.0	6.2
Professional and Technical	17.9	26.2
	46.3	60.0

(of all house purchasers)

5.10. These high ratios reflect the lack of unfurnished rental housing for middle income groups in Scotland and the proportionately larger numbers who find employment in the Professions. For the Central Borders it would appear that demand, not supply, has been the limiting factor in private building.

5.11. A glance at the most recent statistics on income distribution confirms this finding. In the Central Borders only 30% of incomes exceed £1,000 (before tax) as against 32% for Scotland

generally and 39% for England. When incomes in excess of £1,200 per annum (before tax) are considered, the Central Borders and Scotland both have a ratio of 18%, but this is still significantly less than the 24% of England.

Table 5. VI
1965

Income in excess of (a) £1,000 p.a. before tax; (b) £1,200 p.a. before tax as proportion by number of all incomes.

	(a) over £1,000 p.a.	(b) over £1,200 p.a.
C. Borders	30%	18%
Scotland	32%	18%
England	39%	24%

5.12. There is thus a comparative deficiency of potential house-owners in the Central Borders, and this deficiency may be even greater than crude income figures suggest. The impact of local rating and the larger expenditure involved in heating, mean that the minimum income required by potential house-purchasers tends to be larger than for the UK as a whole. A recent survey put the median weekly income of those buying homes through mortgage as £27.2 in Scotland, as against £26.12 in London and £21.6 in the North East—a reflex both of above-average professional demand and below-average income levels.

5.13. Before making any estimate as to future demand certain data must be set out. Firstly, there is no general shortage of housing sites. There is, however, a wide difference in attractiveness to private buyers of various locations: Selkirk, Melrose, Peebles rank high, but the larger burghs are rather less popular. Secondly, there is a net migration from the area of around 400-500 a year. Admittedly many are school leavers, but a substantial proportion are established professional and commercial people with a high mobility factor. As a result there is usually a fair supply of existing houses for sale—an incomer at present could probably find suitable accommodation from the existing stock. Until this loss of population is halted, then housing from this source will be a feasible alternative in many cases to new building. Another factor which is relevant to the estimate of housing needs is the increasing number of sub-standard houses (notably in Galashiels) which have been privately bought and renovated. If a decision is taken by the larger burghs to redevelop the older neighbourhoods, then many of these privately-owned conversions would disappear. There is no way of knowing whether the occupants will purchase new houses or become council tenants. Finally there is a possibility that, if industrial development succeeds in the Central Borders, the demand for retirement housing may decline. Although all these factors are likely to damp

down demand, they are not quantitatively significant and could be offset by suitable government policies. Private housing demand should rise by nearly 60% between 1967 and 1980. The rise will come from two sources: (1) the anticipated continuing rise in real incomes (extrapolated here at 2½% per annum), and (2) the demand for houses by incomers. The total addition to private housing stock should reach 1900 units by 1980. This would indicate a ratio of private house-building to all local authority building of around 27% for the whole period.

Table 5. VII

(1) Central Borders	Private housing requirements	Total demand
	1968 1981	1968-1981
(a) Normal demand	100 p.a.-125 p.a.	1,550
(b) From new growth	— 35	350

Estimated requirements 1,900

Notes: Item (1) (a) reflects normal expectations to house owning sectors based on National Income rising at 12½% p.a.

(2) Composition of additional potential house-owners 1967-1970, (break-down of item (1) (b) above).

	No. of Males	Potential House-owners
Education, etc.	430	125
Medical, Dental	50	50
Professional, Scientific	130	80
Banking and Insurance	200	55
Miscellaneous and new industry	100	40
		350

Source: Social Services Paper, modified by a projection of future income structure. The education demand is provisionally overstated, while, lacking information, that of new industry may be an under-estimate. Local Authority building is assumed to average 500-550 p.a. to 1981.

Possible distribution of future private housing based on past trends: total needs 1967-85.

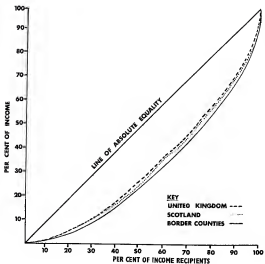
Galashiels area	250
Harwick	250
Selkirk	200
Peebles	200
Melrose	200
Roanburgh, Selkirkshire	600

The residue are likely to be minor developments in smaller burghs and villages.

5.14. These must be tentative estimates in that no indication of the amount of new factory capacity available has yet been given. This estimate assumes that five small factories, employing 1,000 men, will be in operation by 1980 but makes no allowance for the number of amalgamations likely to occur (10% of textile capacity may be affected). Another problem is that of the timing of any increase in private house building. Additional demand from the development programme is unlikely to appear before 1971 and allowance has been made in the estimate for the time lag in transmitting rising incomes into house purchases. It should be noted that in 1981 private building would constitute 30% of local authority—a substantial rise—and that this should increase to over 40% in subsequent years.

FIG. 5.1

DISTRIBUTION OF INCOME IN THE UNITED KINGDOM, SCOTLAND AND BORDER
COUNTRIES OF ROXBURGH, SELKIRK AND PEEBLES, 1966



Location of Population

Introduction

6.1. The increase in population of the Central Borders up to a level of just under 100,000 by the end of 1980 involves a choice between various locational possibilities. It is desirable, therefore, to examine the various alternatives in order to assist in the identification of an optimum location of population within this region, given the additional population which has to be allocated. This chapter should be interpreted as more of a theoretical paper concerning principles of location which may be used as a basis for decision-making on the choice of sites.

6.2. Cost-benefit analysis has been used for a number of years to assist in the making of a rational choice between various alternatives, particularly in the field of public investment, e.g. in the building of new bridges, railways, road improvements. The problem of population distribution within the Central Borders is partly one of public investment alternatives and lends itself to an application of cost-benefit analysis, although as with other public sector investment alternatives, the returns to this investment are frequently of a nature which prevents their ready quantification in terms of money. This reason, together with the limitation of resources available to this study, has meant that detailed analyses of the costs and benefits involved in different location decisions could not be undertaken. However, it did prove possible to construct an indicator of benefits which may then be compared with the value (in monetary units) of most of the major costs involved in the different locational possibilities.

Costs

6.3. The aim of this section is to assess, as far as is feasible, the differences in the costs of the various development alternatives within the Central Borders. Conceptually this involves the two separate steps of enumeration and evaluation. For the former, the costs may be divided into primary and secondary costs. The primary costs are all those associated with the execution of the project which accrue specifically to the development agency, while the secondary costs are those costs which stem from the project but which fall upon the community at large. Thus, for instance, the costs of new sewerage and water plants will be primary, whilst the costs of increased road congestion, loss of amenity, etc., will be secondary. For evaluation purposes the true cost of each alternative project would be the opportunity cost of the resources embodied in it. Typically, for the primary costs these would be determined by the market, whereas, for the secondary costs, these would have to be calculated independently since for these there is

usually no such market. Implied in this study is the assumption that, at least as far as the primary costs are concerned, the market price does in fact reflect the opportunity cost of the resources employed.

6.4. Ideally, the procedure to be adopted in costing the development alternatives would be to collect unprocessed data for the various cost components associated with a number of possible population distributions, and then to consider which gave the lowest cost and by how much the others exceeded this.

Statistics

6.5. In order to reduce the choice of distributions to manageable proportions the analysis has been cast in the form of six models. With the time and resources available it did not prove possible to revert back to the original data, and instead statistics provided by the Planning Research Unit, Edinburgh, had to be used. These figures were derived from the so-called threshold analysis.

6.6. There are certain problems associated with threshold analysis. Basically, threshold analysis implies a discontinuity in the slope of the cost curve associated with the crossing of each threshold (reflecting an immediate increase in cost per capita); however in practice not only is the slope of the cost curve usually continuous but also the second derivative is often small (for example, reflecting a slowly decreasing cost per capita preceding a slow increase). Thus, the figures assembled all relate to the points on the cost curve where there is a change in the relationship between increases in costs and increases in population, and to the extent that these changes are small, or the increase in cost level is proportionately small, the figures will in fact relate to points arbitrarily chosen by the dictates of the particular threshold present. This is also true for the second feature which should be noted. Threshold analysis implies that the costs associated with each threshold must be indivisible, representing an immediate and irreducible outlay. But should these figures be based upon per capita expenditures capable of piecemeal development, then there can be no threshold at that particular population level. This certainly happens with some of the cost figures used here which have been calculated from notional per capita figures. This deficiency is important for the study for two reasons: first, it serves to reinforce the above argument for the points on the cost curve being arbitrarily chosen; secondly, although the actual order of the population in each town has been dictated by

the particular assumptions of each model, the actual increase at the margin may be influenced by the presence of a threshold. To the extent that no such threshold exists it would obviously be erroneous to allow the population distribution to be influenced in this manner.

6.7. The third difficulty is that threshold analysis fails to embrace all the relevant costs. The data does include under the heading of physical costs (Statistical Table S. XXII) the additional costs of building on slopes, the provision of main roads and trunk sewers and the acquisition of land. Under the headings of water and sewerage are included the additional costs of expanding the capacity of existing and/or installing new plants for both water and sewerage. All these costs are calculated for an average density of 40 persons per acre. But the data does exclude the costs of increased road congestion, the running and maintenance costs and the costs associated with different industrial distributions. Since these costs will vary between the different models and since the conclusion to the analysis will be in the form of a capital cost, the present value of these cost streams should be calculated for each model and aggregated with the other costs. However, since the figures are not available, the only procedure open to the analyst is to derive some subjective estimation of how the inclusion of these costs would be likely to affect each model relative to the others.

6.8. Before turning to the cost analysis itself two further remarks must be made. First, the ensuing calculations relate only to the costs incurred by each project over and above its normal development cost. By 'normal' is meant those costs associated with building on level land, with easy access to service roads and without the need to expand the water and sewerage plants. Secondly, it must be remembered that the costs will be looked at only from the point of view of the population distribution, all considerations relating to different distributions of industrial activity being ignored.

The costs of the various development models

6.9. This analysis, for the reasons stated in paragraph 6.5, has been cast in the form of six alternative development models. Since, by definition there is no element of choice in the distribution of the already committed development, this has been excluded (which results in the net increase in population being reduced to 16,000). The models hypothesised here are the following:

Model 1. The concentration of as much population as possible in St Boswells with the residue being allocated to Galashiels.

Model 2. The population increase divided between Hawick and Galashiels.

Model 3. The population increase divided between Jedburgh, Hawick and Galashiels.

Model 4. The population increase divided between Galashiels, Selkirk, Clovenfords, Melrose and St Boswells.

Model 5. The population increase divided between Hawick, St Boswells, and Galashiels.

Model 6. The population increase divided between Jedburgh, St Boswells, Hawick and Galashiels.

6.10. The analysis of the cost of these various models will be conducted in two separate stages. The data supplied related to the costs associated with developing each town and the first step is to tabulate this information for each of the various towns. As was explained in paragraph 6.6, the cost figures were provided in a form which related the additional costs necessary to provide water, sewerage, roads, etc., to given increments in population. Thus, in Table S. XXII the increment in population is given in column 2, the actual costs associated with this increase being given in columns 4 to 6. In the event of (a) there being no increment in costs, no corresponding figure is given, and in the event of (b), the expenditure being on a per capita basis (see paragraph 6.6), the letters pc have been inserted after the relevant cost figure. The total increase in population for each town is given in column 3 and the accumulated total cost for that population in column 9. Finally, the last entry for each town in column 3 represents the maximum increase in population that is feasible for that town.

6.11. The second step of the analysis is then to use this information to derive the cost by town of the population increase implied by each of the models. The workings for this step are set out in full in Table S. XXIII. Thus, for model 1, the highest increase in population in St Boswells is 11,125 (column 2), resulting in a total cost of £495,375 (column 6). The 4,875 residue of population is then allocated to Galashiels, the first 3,000 (column 3) at a per capita cost of £34.1 and the remaining 1,875 at a per capita cost of £12.0 (column 5). The combined development of St Boswells and Galashiels is therefore at a total additional cost of £987,675 (column 8). This procedure is then repeated for each of the six models. Finally, the resulting population distributions under each of the six assumptions are summarised in Table S. XXIV, which also gives the aggregate population (including the existing population plus the committed expansion) for each of the towns.

6.12. The main conclusions to this part of the analysis, namely the additional costs associated with each model, are set out in Table 6.1, which shows that the first model is the cheapest, the second the most expensive and that the rest, apart from Model 6, all have costs with £200,000

Table 6.1
Development costs as a percentage of 'normal' costs

Model	Cost	% of normal costs
1	987,675	7.5
2	1,580,186	15.0
3	1,800,323	13.7
4	1,631,880	14.1
5	1,704,250	12.9
6	1,571,070	11.9

of the most expensive. In order to place the additional costs associated with each model in true perspective, those have been expressed as a percentage of the 'normal' costs as defined in paragraph 6.8. The 'normal' cost, which by definition is the same for each model, was calculated to be £13,168,000, based upon a 'normal' per capita cost of £823¹.

Benefits

6.13. There are many benefits which occur through the introduction of new population into the Central Borders. For example, more shops will be required to service this additional population, which in turn will result in there being a greater variety of choice for all the consumers in the Central Borders. Additionally, there will be the increased probability that some theoretical shopping population threshold may be crossed, which will lead to the setting up of a type of shop which had not previously existed—again widening consumers' choice. Also the additional supply of labour will mean that extra industry is more likely to be attracted into the region, thus further increasing the probability of attracting complementary firms. Finally, by way of example, educational authorities will be able to offer a greater variety of courses in further education. All of these, together with any other benefits, are of course economies of scale in the provision of services by the public and private sector to the increased population.

6.14. The extent to which these economies of scale will apply will be a function of the extent to which the population is scattered throughout the region. If, for example, the population is widely scattered throughout the region thus preventing the creation of any urban centres, then many of these economies of scale will no longer be so extensive. If, however, the population is concentrated in one particular area, then the resulting small travelling distances involved will mean that maximum use may be made of these economies of scale.² The economies of scale therefore may be taken to be a function of, first, the economic weight which may be attached to each unit of population, and, secondly, the distances between the various units. One form of this function is the Gravity Formula where the indicator is the sum of a constant multiplied by the products of the economic weights attached to each element of population, divided by a variable to some exponent.³ This variable would be an indication of the extent to which the economies of scale diminish as two elements of population are spatially removed from each other.

6.15. For simplicity, each urban area will be examined separately, population being taken as the indicator of the economic weight to be associated with each urban area. The time taken to travel between the various urban centres has been used as the denominator (time rather than distance being possibly a more reasonable indicator of the disadvantages of travel-to-work, travel-to-shop, transport of goods, etc.). The application at this stage has been confined to the calculation of the index associated with one

extra person being added to any of the following population centres in the Central Borders, namely, Galashiels, Melrose, St Boswells, Hawick, Jedburgh, Selkirk, Earlston, Peebles, Innerleithen, Walkerburn and Darnick. The population as at 1965, together with the committed development, has been adopted for these various centres. The data used for this analysis together with the results are shown in Tables S. XXV, S. XXVI, and S. XXVII.

6.16. Table S. XXV shows the population of the various centres, with the elements in the table denoting the time taken to travel between these centres. In Table S. XXVI the indicator is computed by dividing the population of the town relating to the row in which the figure lies by the time taken to travel between that town and any other town listed at the top of the table. The corresponding figure in Table S. XXVII is obtained by dividing the population of the town (again relating to the row in which that figure lies) by the square of the time taken to travel between that town and the town which relates to the column. This table is based upon a second alternative assumption concerning the effect of an increase in time upon the economies of scale, i.e. the economies of scale are assumed to diminish with the square of the time taken to travel between the centres rather than to diminish linearly. If the figures are then summed down each column, the result is an indicator of the benefits which accrue to the Central Borders from the economies of scale resulting from the addition of one extra unit of population to the town associated with that column. For example, in Table S. XXVII the figure 14,434 at the foot of the Galashiels column is an indicator of the benefits which accrue from putting one extra person into Galashiels. This is, of course, based on the assumption that the benefits may be indicated by the gravity formula with an exponent of two. The figure 17,278, in Table S. XXVI, is the sum of the benefits calculated under the same assumptions except that the exponent is now given a power of 1.

6.17. What is of interest to note from these figures is the large indices which accrue as a result of putting an extra unit of population into either Galashiels or Hawick. When the exponent is 2, it is noticeable that the benefits which accrue to either of these two centres is over twice that which accrues from putting an extra unit of population into any of the other centres. On the assumption of an exponent of 1, it will be observed that the benefits are still much higher for Galashiels and Hawick, although an extra unit of population in either of these two centres will only generate benefits of less than twice those resulting from locating an extra unit in any of the other centres. Of course, should another centre, for instance St Boswells, be built up then the larger is that centre the greater will be the benefits derived from locating an

¹Supplied by the Planning Research Unit, Edinburgh University. Based upon figures quoted in 'Scottish Standards, needs and objectives April 1967', published by Ministry of Housing and Local Government.

²The extent to which economies of scale are further increased has been discussed in the next section of this chapter.

³ $W = \frac{P_1 P_2}{D^x}$

⁴ $x = 1, 2, 3$

extra person there. However, even on the assumption that the population of St Boswells is as high as 12,600, the extra benefits would still not be as great as those derived from locating an extra unit of population in either Hawick or Galashiels. This is irrespective of whether one assumes an exponent of 1 or 2.

6.18. The above, of course, can in no way be construed as being a definitive analysis of location benefits, since the gravity model is not an analytic but rather a descriptive tool. In addition, some of the assumptions which have to be made (for example, the benefits being proportional to the size of the economic activity) may be subject to some criticism. Moreover such detailed assumptions as the value of the exponents applicable to this distance or time factor must inevitably be somewhat arbitrary. However the postulates are not without relevance to the benefits involved.

Conclusion

6.19. In the previous sections statements about the costs and benefits of different population distributions have been prepared, and it now remains to interpret these figures as far as the accuracy of the statistics will allow.

6.20. To turn first to the costs: as stated in paragraph 6.12, the first model is the cheapest, the second the most expensive, and the rest, apart from model 6, all have costs within £200,000 of the most expensive model. This suggests that the decision regarding which model to develop should proceed in two stages. First, it must be decided whether it is worth spending £800,000 to £1,000,000 more to develop models (2-5) rather than model 1; secondly, if so, which of the models (2-5) should be developed. Attention will be devoted to the first step, and purely for illustrative purposes, the question of the second will be begged by adopting model 4. The choice, therefore, lies between placing all the population increase in and around Galashiels (model 4) or to develop St Boswells.

6.21. As a first approximation it will be held that model 4 will be preferable if (a) there are additional costs of £1m. associated with St Boswells which have not so far been considered, or (b) there are benefits associated with model 4 in excess of £1m.—or some combination of both. Unfortunately the first part, that of the question of costs, cannot really be answered without further research; for the costs considered are far from being exhaustive. Important costs which are unquantified include the following: (a) congestion costs (*A priori* one would expect the inclusion of these to favour model 1), (b) operating costs, (c) any detailed costs associated with the industrial sites; and, (d) the costs associated with the non-provision of planning flexibility. Here, again, one would expect the advantage to be in favour of model 1, since model 4 implies no spare capacity for growth, little planning flexibility, etc.

6.22. So it may be said that, in addition to the costs actually quantified, those costs not taken into consideration also tend to favour model 1. It would appear, therefore, that any arguments in favour of model 4 must rest largely upon the benefits. But here it must be pointed out that one deficiency of the analysis is the assumption that there is no significant divergence between the industrial and population distributions. Should this prove not to be the case, then the analyses of the benefits would have to be reworked.

6.23. It must be noted that the analysis of benefits has concentrated on one formulation of economies of scale. There are, of course, different forms of the function which still reflect the nature of the postulated relationship between the variables; these alternative forms however would alter the numerical values of the indicators relating to each centre while probably still preserving the order. Additional benefits take the form of subjectively valued items such as amenity; amenity variations result from developing a new town centre rather than from the expansion of an old centre. One direction of the amenity factor would tend to reduce the indicator for Galashiels relative to say, St Boswells. However, amenity may operate in the reverse direction in that St Boswells might be regarded by some as having less value than Galashiels. Little can be said objectively about the relative importance of amenity, or any of the other benefits which refer to the distribution of population.

6.24. It has been assumed here that the distribution of benefits over time has been the same for all centres. However, it must be pointed out that any future expansion would involve higher costs in Galashiels in particular. If a cheaper area, such as St Boswells, was expanded now it might therefore provide a nucleus for future expansion at a lower total cost. But this argument is diminished, first by the fact that the probability of this occurrence is less than unity, and secondly by the fact that the further ahead in time this future expansion is likely to occur, the less the current value of the discounted benefits, because of the under utilisation of resources in the intervening period.

6.25. Finally, it can be said that model 1 will be considerably cheaper than the other models, but that these, especially model 4, will provide greater benefits in the form of reduced travelling and greater concentrations of population. Since the benefits, particularly that of the value of having a regional nucleus, cannot in their nature be quantified in monetary terms, no decision can be arrived at solely upon the application of this analysis. However, the fact that the study has been conducted should at least bring to light the sizes of some of the benefits and costs involved. The decision as to whether the additional benefits of models 2-5 are worth the extra, largely quantifiable costs must rest upon a value-judgement made by the decision-maker.

Transport

Introduction

7.1. The purpose of this chapter is to highlight the problems which the general policy of development will have on the provision of transport services in the region. If decisions relating to the main forms of transport are to be taken, an economic assessment of the costs and benefits involved is required. Such an assessment would help, for example, when considering the retention of services and would therefore be pertinent to the Central Borders, where falling demand has meant that the one railway line through the area is not now a commercial proposition, while the network of bus services has also been reduced. Any attempt to state future requirements, apportion cost or evaluate the social consequences of further withdrawal of these services needs an estimation of demand. Three aspects of demand are especially relevant to the situation in the Central Borders, namely the demand for private road travel, the demand for public road travel and the demand for rail travel. While the following is an attempt to assess the various factors it can in no way be construed as a full analysis. For this, further work on all aspects of demand would be desirable; in particular a detailed economic analysis of the road system, which it has not been possible to make.

Road Passenger Travel

7.2. Public passenger transport in the Central Borders is operated almost entirely by Scottish Omnibuses Ltd. The existing services, however, are not as extensive as they once were, and in this respect the Borders follow the trend which has occurred, and is likely to continue in rural areas.¹

7.3. The object of this section is to estimate the demand for bus travel on routes through the Galashiels area in 1980, this area being chosen because one route in particular provides direct competition with the railway.

7.4. One factor influencing demand is population size. If however, this was the only important factor, passenger journeys would bear a simple, direct relationship to changes in population, and passenger journeys per head would be a constant. On the routes through Galashiels this has not been the case; passenger journeys per head of population have fallen. Other factors must therefore influence demand, the most notable of which is the growth in the number of private cars, which is evidenced by the increase in the numbers of vehicles licensed. (see Table 7.1).

7.5. If the increase in population in the Central Borders is to come mainly from Edin-

burgh and Glasgow it is conceivable that further growth in ownership of vehicles may not be as rapid as in the past, for population per car in both Edinburgh (7.3) and Glasgow (12.6) is higher than the border counties (average of 5.8) and the National Average (5.9), i.e. there are less cars per thousand people. On the other hand the demand for private cars by the incoming population would probably not be the same as their present demand, because of the different characteristics of the area.

Table 7.1

	No. of Vehicles Licensed		
	1955	1962	1965
Peebles C.C.	1,300	2,000	2,600
Selkirk C.C.	1,400	2,300	3,200
Roxburgh C.C.	3,500	6,100	8,100

7.6. On the bus route from Edinburgh to Carlisle the number of journeys per head per annum fell from 2.25 in 1958 to 1.57 in 1965, which is a compound rate of decrease of 5.05% per annum. If this rate of decrease continued to 1980, the resulting passenger journeys per head would be 0.719. On the route between Galashiels and Berwick the number of journeys per head fell from 14.17 in 1958 to 11.79 in 1965, a compound rate of decrease of 2.82% per annum which would give 7.95 journeys per head in 1980. Passenger journeys per head on the route between Galashiels and Kelso fluctuated between 1958 and 1965, being 59.04 in 1965. Assuming a similar future rate of decrease on this route as on the previous two, journeys per head in 1980 would be 27.12 if discounted at 5.05% and 39.82 if discounted at 2.82%. These figures are likely to be too pessimistic; a more likely assumption is that the trend will level out before it reaches these proportions.

7.7. Two limits could be suggested for future bus demand on the routes in 1980. The first assumes that demand is solely dependent on population, the second assumes that past trends in passenger journeys per head will continue until 1980. Lying between these two limits would be an estimation of demand with the assumption that the decline in passenger journeys per head ceased when the population increase became significant.

7.8. The first limit could be estimated provided present demand between towns on the routes was known. Unfortunately detailed statistics relating to the existing pattern are unavailable, but a good approximation may be estimated using the gravity model.² Basically,

¹See, for example, *The Transport Needs of Great Britain in the next 20 years*, H.M.S.O. & Road Research Board, N.M.S.O.
²See W. Isard, *London and Space Economy* (New York 1960) p. 61.

this states that the number of passenger journeys demanded between the towns is a function of the mileage between, and the population of, the two towns. Taking 1965 as the base year, the proportion of passengers travelling may be calculated by taking each route serving the area in turn, (namely, Edinburgh-Carlisle; Galashiels-Berwick; Galashiels-Kelso). On the route between Edinburgh and Carlisle there are seven major areas of population; if one started at Edinburgh, 6 alternative journeys could therefore be made, if one then started at Dalkeith, a further five could be made, and a further four from Galashiels, and so on. There are thus 21 different outward journeys possible on this route and a total of 42 journeys in both directions. From any one place taken separately, however, the number of different journeys possible is 12. Thus the proportion of total journeys likely to come, for example, from the Galashiels-Melrose area would be $12/42$ nds of journeys made. This figure does not make an allowance for the likelihood of any particular journey being more popular than another. To allow for this a weighting factor has to be used.

7.9. It has been found that the number of bus trips made between any two towns falls off as the distance between them increases, and that the relationship between bus trips, population and distance travelled is expressed as

$$T = \frac{P_1 P_2}{d^2}$$

where T = number of trips, P is the population of each town, d is the distance, and A is a constant depending on the time period being examined and on the availability of other means of travel. If this calculation is applied to each pair of towns on the route a 'weight' may be found, and a total weight obtained by adding these separate weights. By relating the total number of passengers on the route in 1965 to the total weight, a proportion is obtained. Then, assuming that a similar relation exists between the passengers carried and the weights of individual pairs of towns as between total passengers and the total weight, the number of passengers from each pair of towns on the route may be found by multiplying their weight by this proportion. Furthermore, if the populations of each pair of towns on the route are increased using the population distribution for 1980 recommended in the Physical Planning Volume, then bus demand in 1980 may be determined⁴ if it is assumed that demand will increase by the same percentage as that of the population product. These calculations give the total number of passengers on the Edinburgh-Carlisle route in 1980 as 1,036,806 (a 12% rise over 1965).⁵

7.10. Similarly, passengers on the Galashiels-Berwick route in 1980 would be 525,360 (a 44% rise over 1965), and, on the Galashiels-Kelso route as 13,691,179⁶ giving a combined total of 15,253,345. These estimates cannot really be regarded as accurate beyond three significant figures.

7.11. Two extra assumptions have been made in estimating this figure:

1. It was assumed that an increase in population size in an area would produce a similar increase in the number of trips on the routes through the area. In fact, the number of trips made is likely to be higher. One of the consequences of fairly large immigration into an area is that, to begin with, people frequently visit their previous home towns.

2. It was assumed that the railway would remain open. If the railway were to close there would be additional passengers carried by buses. Present rail passengers are in the region of 520,000 per year. After an increase in population this figure would be 582,400, assuming an equivalent percentage rise in rail passengers to that in bus passengers on the Edinburgh-Carlisle route. Total bus passengers on this route in 1980, if the railway closed, would therefore be 1,036,806 + 582,400 = 1,619,206 (a 75% increase over 1965).⁴ This does not signify a large absolute increase in traffic volume on the road for present bus travel forms only a relatively small percentage of the total.

7.12. These calculations present the upper limit of the demand. A lower limit of demand in 1980 can be estimated, assuming that the past decrease in passenger journeys per head is likely to continue either until such a time as the population begins to increase significantly, say 1975, or right up until 1980. (The past decline has been so marked that if an even steeper downward trend is used to fix the lower limit the number of bus passengers would be unrealistically low by 1980.) This lower limit is found by multiplying the upper limit based on the gravity model by a weight which indicates the autonomous decrease in passenger journeys per head, namely:

Passenger journeys per head 1980 (or 1975)

Passenger journeys per head 1965

7.13. If the decrease in passenger journeys per head is expected to continue until 1980, the number of passengers travelling on the Edinburgh-Carlisle route in 1980 would be 476,308 (a 48% fall over 1965), on the Galashiels-Berwick route about 354,197 (a 2.8% fall), and on the Galashiels-Kelso route 7,760,844; making a total of 8,591,349. This, however, is likely to be too pessimistic for the downward trend in passenger journeys per head would be arrested when the population increase became significant. If this arrest was assumed to occur in 1975 the number of passengers on the Edinburgh-Carlisle route in 1980 would be 617,417 (a 33% fall over 1965), on the Galashiels-Berwick route about 404,001 (a 10% increase), and on the Galashiels-Kelso route 9,303,156; making a total of 10,324,574.⁶

7.14. The upper limit of demand on routes through the Galashiels area in 1980 is therefore 15,253,345 passengers on all routes. The lower

⁴ Derived as determined in each case, for simplicity, only from the two nearest towns in each case.

⁵ See column Table 5, XXVIII Part A for the derivation of this figure.

⁶ The gravity formula may not be quite as reliable when large percentage decreases in population are involved.

⁷ Assuming the whole line is closed, and not just the section from Edinburgh to Galashiels.

⁸ See Table 5, XXVIII for the derivation of these figures.

limit, assuming a continuous decline in passenger journeys per head until 1980, would be 8,591,349. If the decline is arrested when the population begins to become significant, the demand would be 10,324,574 in 1980. 1965 passengers on all routes were 2,425,015.

Railway Travel

7.15. British Rail state that the demand for rail travel through the Central Borders has been falling, which is evidenced by the decline in bookings. This has meant that the line is no longer operable as a commercial concern, earnings of £101,800 p.a. are comparable with estimated direct expenses of £357,000 p.a. Again, the reasons stated for this fall in demand are a decline in population and the increase in use of private cars.

7.16. By way of explanation, it should be stated that the centre of the earnings calculation is an average fare which is derived from various fares, cheap day returns, excursion tickets, etc., which are available for each stretch of the line. Passengers who book beyond the limits of the line credit the line at this average rate per mile for that part of the journey undertaken on the line. For example, if a passenger books at Hawick to travel to London, the station's bookings would increase by £4 (approx.) while the earnings would increase by the average fare between Hawick-Carlisle. The remainder of the fare is credited to the Carlisle-London line. The true loss in revenue consequent upon closure would include these supplementary earnings to sections outside the line, with an appropriate allowance made for any earnings which would be retained if passengers still travelled to Edinburgh or Carlisle to join a train. If this adjustment is made, the revenue of the line is £125,000 p.a. and not £101,800 p.a.¹

7.17. Using again the distribution in population recommended by the Physical Planners assuming a direct relationship between population and journeys, the planned increase in population would mean a further 62,400 journeys per year. However, even with this increase, the railway would not be a commercial proposition. In such circumstances it is important to consider the line in a framework wider than a straightforward commercial analysis, and to compare its social benefits with its social cost by means of a cost-benefit study. The most important points to note in this connection are the time saved by rail travel and the fact that if the railway were to close only one public service would be provided, the 'Bus'.

The Rail Bus Choice

7.18. Two questions need to be answered. First, if only one service is to be provided would the community benefit more from a bus service or a rail service? Secondly, are the benefits derived from this one service greater or less than the benefits from a continuation of both services?

7.19. In similar calculations on the Victoria Underground line in London² a rate of 7s. 3d. was given to working time and 5s. to leisure

time. It was assumed that 5% of the journeys were in working time and 95% of the journeys in leisure time. Bringing these rates to present price levels³ gives a working time rate of 8s. 9d. per hour and leisure rate of 6s. per hour. Subsequent work by Beesley,⁴ and the reasoning below, indicate that this leisure rate is too high, a more probable rate being 3s. per hour for bus passengers, and 4s. 6d. per hour for rail passengers (see below). Using this information the above questions may be answered. Firstly, if only one service is to be provided, would the community benefit more from a bus service or rail service?

Rail Passengers

7.20. In 1966, 8,574 people per week travelled between Edinburgh-Carlisle (or Carlisle-Edinburgh) during the winter period, and 12,944 per week during the summer period. If the winter period is taken as 35 weeks and the summer 17 weeks (June-October),⁵ this gives an average of 10,002 per week for the year. Of these, an average of 2,263 per week travelled between the Galashiels area and Edinburgh. If these latter travellers had made the journey by bus they would have each taken about 39 minutes longer which can be valued at £346 per week.⁶

7.21. Some of the remaining journeys cover only a short distance and will therefore be ignored as the time saving is small and it is not realistic to reckon 60 separate minutes saved as having the same time value as a whole hour saved. This leaves 7,048 journeys which cannot be allocated specifically. Moreover, if it is assumed that the rise in population would cause a percentage increase of passengers on the railway similar to that on the buses a further 1,300 passengers per week can be expected by 1980 (taking the upper limit of demand), making a total of 8,248 passengers per week. The number of passengers travelling between any two towns is a function of the population of these towns and the distance between them,⁷ which means that an average journey on the Waverley line, excluding trips from Galashiels-Edinburgh, can be calculated as being about 20 miles,⁸ and a 20-mile journey is approximately 30 minutes quicker by train than by bus. If the remaining 8,248 passengers are assumed to make this 20 mile journey, then the value of the time they save can be calculated, using the assumptions above, as £971 per week, which, when compared with the saving in fare possible on the buses of £822 implies that the fare differential is not as high as the value of the time saved.⁹ The total value of time savings to train passengers therefore equal £346 + £971 = £1,317 per week.

¹Even this figure is an underestimate for it does not include a valuation of the revenue from freight. No attempt to make this valuation is possible, however, for it is a policy decision of British Rail not to provide double-track stations on lines recommended for closure. *Quoting the Great Western of the Victoria Line, Journal of Royal Statistical Society, Ser. A, Vol. 128, Part 1 (1965).*

²See the Ministry of Labour's Index of Wage Rates. *HM, Sunday, The Value of Time Spent in Travelling—some new findings, June 1964, p. 174.*

³Source: Railways Magazine.

⁴Using the assumptions above, 81% journeys in leisure time valued at 4s. 6d. per hour 1% in working time valued at 8s. 9d. per hour.

⁵See, for example, Year 6, op. cit. p. 61.

⁶This can be supported by reference to British Rail figures on the line.

⁷In all these calculations it is assumed that congestion levels in 1980 will not be such as to invalidate estimates based on present congestion levels.

7.22. The costs of operating the present passenger railway service is £6,865 per week using the figure given by British Rail,² which is comprised of terminal cost, movement cost, and track and signal cost. The latter is taken to be the costs of maintaining the line over and above the standards necessary for freight. This figure will not however reflect the gain to the railway upon closure insofar as the railway will still have to pay back loans on the line.

Bus Passengers

7.23. In 1966 there were 17,786 bus passengers per week. With similar assumptions to those above, the value of time saved if the journeys were made by train instead of by bus would be £1,462 per week, which, when set against the fare differential of £1,778 per week, implies that this valuation of bus passengers time is not as high as the extra fare they would have to pay if they opted for the railway.

7.24. If the 6s. leisure rate obtained from the Victoria line were used, the value of time saved would be £2,729 per week. This is greater than the extra fare and would not help to explain why the bus is chosen in preference to the faster train. Beesley suggested that people with lower incomes value their leisure at about one-third of their working wage, while those with higher incomes have a leisure rate of about one-half of their working wage. As the income distribution of bus/rail passengers is not known the standard work valuation of 8s. 9d. is chosen, and if it is assumed that a richer section probably travel by train, and a poorer section by bus, then 4s. 6d. hour and 3s. hour for train and bus passengers leisure time would be appropriate.

7.25. So far no account has been taken of the increase in bus passengers expected. It was suggested that 2,152 extra bus journeys per week would be made in 1960 on the Edinburgh-Carlisle route. At the upper limit, these have a value of £179 which brings the total value of time lost by choosing the slower service to £1,462 + £176 = £1,638.

7.26. The cost of running the existing bus services per week is £985. If the railway closed, Scottish Omnibuses estimate an additional cost of £1,410.³

Summary of Results

7.27. A work time rate of 8s. 9d. has been used throughout:

Time saving to rail passengers over journey by bus (Using 4s. 6d. leisure time) = £1,317 per week.
Time saving if bus passengers travelled by rail (Using 3s. leisure time) = £1,638 per week.
Cost of present rail service £6,865 per week (B.R. figures); £5,077 per week (extrapolated figures).
Cost of present bus service £985 per week. New bus service £1,340 per week.

7.28. If the rail service were to shut and the passengers travelled by bus the result to the community would be:

A saving in the cost of the railway—extra time taken by rail passengers using bus + (a saving in fare by passengers + increased revenue to bus—loss of revenue to railway)—cost of new bus service. The section in brackets represents a transfer payment with a net value of zero. The result, therefore, is:
£5,077 - £1,317 - £1,410 = £2,350.

7.29. If the bus services were to shut and the passengers travelled by rail the result would be:

A saving in the cost of the bus—extra time taken by bus passengers travelling by train + (extra revenue to railway—loss of revenue to bus—cost of doing ticket)—cost of new train service. The section in brackets again represents a transfer payment with a net value of zero; and it is assumed that the existing trains can take the increase in passengers (a not unreasonable assumption given the existing spare capacity on the trains). The result therefore is:
£985 + £1,638 - £0 = £2,623 per week.

From this it may be concluded, if the valuations of time and costs are adopted, that as significant greater benefit is given to the community if the resources now used in rail operation are used elsewhere than if the resources used on bus operation are transferred.⁴

7.30. Costs which have not been incorporated include loss of welfare from a lack of choice, the cost of another station at Dalkeith if the existing one proves badly sited for the commuter travel to Dalkeith, and the cost of travel to and from railway stations. The main benefits considered were some of the time savings, but there are many other benefits which need to be mentioned, especially in connection with the other questions asked—are the benefits derived from one service greater or less than the benefits from a combination of both services?

7.31. It is convenient to explore the wider social benefits of the railway under the heads of the amenity aspect, the road aspect and the location of industry. The amenity the railway offers is always stressed, with reference to particular examples, at Transport Users Consultative Committee meetings. In general it would appear to consist of a service which is thought to be more reliable in winter, which provides more comfortable travel, allows for the conveyance of prams, etc., as well as the important factor of time savings quantified above. The extra journey time by bus could be sufficient to deter people who regularly want to visit Edinburgh or Glasgow from living in the Borders areas. Newcomers travel to their previous home areas fairly frequently after first moving, and as these areas will be at least as far as Edinburgh or Glasgow the point of accessibility is vital. With a larger population, services and shops will become more specialised; trade and travel will be extended; the percentage increase in travel will be larger than the percentage increase in population, and the value of the railway will increase considerably.

7.32. The railway, by providing adequate parking facilities at stations would take a positive step in attracting commuter traffic from the road, and any measure alleviating the congestion in Edinburgh is to be welcomed. The City Engineer's office in Edinburgh has recently drawn up a plan to prohibit all long term parking in the City boundary within 2-3 years, and to accommodate commuters and shoppers at

²This figure would appear too high. Detailed estimates of cost using figures and materials supplied by British Rail, derive a figure of £4,097 per week.

³This estimate that an average bus journey is also 20 miles, and that people from St. Bernice do not use this particular bus route.

⁴Quoted from an unpublished report by Scottish Omnibuses, and checked by estimates in the 'Economic and Commercial Motocycle' Tables of Operating Cost.

⁵The note is directed to general in Appendix A to this chapter.

car parks on a new ring road. The journey to the centre would be completed by bus. If the traveller has to change his mode of transport anyway, it is quite conceivable that the popularity of a railway to the heart of the city would markedly increase, especially if there were adequate parking at local stations. If the railway were closed, the extra traffic, both bus and car, would be an additional embarrassment to Edinburgh Corporation, while the cost of maintenance of the feeder roads to the city would also increase.

7.33. Without entering into the discussions on the relevance of transport costs to the location of industry in Scotland,¹ it should at least be noted that Edinburgh is sufficiently close to the Borders for there to be substantial inter-communication. If a line were closed in such a situation it would reduce the economic interchange and thus one possible benefit to the Central Borders community, as well as to the other areas served by the line.

7.34. The wider benefits of the bus service are due primarily to the physical characteristics of the service and may be summarized as greater accessibility, greater flexibility, and greater frequency. The bus may be boarded far more

easily than the train, can reach outlying districts, and its route can easily be adapted.

7.35. These further benefits of train and bus are difficult to quantify, and time and resources do not allow a calculation of the benefits of different combinations of the two services.

Conclusion

7.36. Projections of future bus passengers, taking an upper and lower limit, were calculated. Other evidence quantified shows no significant difference between the bus and the railway if only one public service is to be provided, although a cost-benefit approach to the merits of the railway suggests that its value to the community is considerable. A bus service is more flexible than a rail service, having a greater number of access points. A solution would probably lie in modifying bus services to concentrate on serving the railway termini, rather than running in competition with the railway to and from Edinburgh. However further analysis would be needed before any detailed solution could be put forward.

¹ See 'Report of Scottish Council (Development and Industries) 1962, pp. 12-15, and 'Scottish Economic Planning and the Achievement of Industry', Commerce & Road, University of Glasgow, Document Paper, No. 6, p. 24.

Appendix A

The choice between different modes of passenger transport

Introduction

7.37. This note deals with the issues involved in deciding about how many and which modes of transport should be established in a region, and it bears on the problem of whether the railway service in the Borders should be closed, reliance for public transport being placed entirely on buses. This is, however, a general discussion of the problem, and no measurement of the quantities involved, either for the Borders or other regions, is undertaken here.

7.38. It will be assumed that there are only two possible modes of transport: fast (the trains), and slow (buses), although the argument could be generalised to cover a large number of modes of transport differing only in speed. An attempt will be made to answer the following questions. First, if only one mode of transport may be installed in a region, should it be fast or slow? Secondly, under what conditions is it desirable to have two modes of transport in a region and under what conditions only one?

7.39. The conclusions arrived at, based on simplifying assumptions, are intuitively acceptable, and can be briefly stated as follows:

- (1) If only one mode of transport is allowed then trains will be preferable to buses, on condition that the average cost per journey on the train exceeds the average cost per journey on the bus by less than the average value to the passengers of the time saved per journey by travelling on the train.
- (2) The train and bus services can run side by side only if there are some people who value

time saved per train journey at more than the difference in fares, and others who value it at less than the difference in fares.

- (3) If the train and bus services could run side by side without gain or loss (that is, average cost = average revenue), and if costs of both are constant or rising, then it is better to have two services rather than one. It may be better to run a single service if the costs of either or both are falling. This case is the most likely one to be met in practice.

7.40. A number of assumptions are made, some of which are stated here, while others will be mentioned as the discussion proceeds.

- (1) No other mode of transport than train and buses is assumed.
- (2) Both the railway and the bus services operate without profit or loss, that is, they equalise average cost with average revenue.
- (3) The two modes differ in only one thing: length of time taken by the journey. In other respects—frequency, comfort, convenience of points of arrival and departure, etc.—they are the same. It is, of course, impossible to make the two services identical in every respect except speed, for if times of departure are identical then times of arrival will be different, and vice versa. Such differences must not be confused with differences in time taken by the journey, but we shall ignore them for the sake of simplicity.

- (4) For the purpose of measuring consumers' surplus by the area under the demand curve, the marginal utility of money for every individual is assumed to be constant at all points of his demand curve.
- (5) Every traveller puts a constant value on the time saved in travelling by rail rather than by bus. This means that the valuation remains fixed at different times of the week (e.g. holidays and working days) and is independent of the fare for the journey. The second part of the assumption neglects the income effect of changes in fare and follows from the assumption that the marginal utility of money is constant. It follows from assumptions 3 and 5 that if there are two services running concurrently, then a passenger will consistently travel either by train or by bus, and will not mix his modes of transport.
- (6) The planning authority will make the choice between providing trains or buses, or both, which results in a greater consumers' surplus than would have resulted from either of the other two possibilities.

7.41. The total demand curve for transport is the horizontal sum of individual demand curves. In like manner, total consumer surplus is the sum of the surpluses under the respective demand curves. If a planning authority aims at maximising consumers' surplus as measured under the total demand curve, then it is implicitly assumed that the surpluses of different individuals are given weights proportional to those areas. However, it is a widely accepted premise that low income groups have a higher marginal utility of income than have higher income groups. This would imply that the satisfaction each person gets from his particular journey is not proportional to his surpluses. Hence a planning authority does not necessarily maximise social welfare by maximising the surplus under the demand curve. This proposition could be expressed differently as the demand curves of different individuals are partly the outcome of the existing income distribution.

7.42. Nevertheless, given the existing income distribution, if two situations, A and B, are compared and it is found that every individual has a higher consumer's surplus under B than under A, then it can be inferred that under the given income distribution B is preferable to A. For this to be possible, it is necessary for the demand for transport by different individuals to have the same price-elasticity at any given price. This point will be considered again in section (1) below.

(1) The demand curve for train and bus journeys when only one service is in use

7.43. Let a journey by train take an hour less than a journey by bus. Let $P_B R$ be the demand curve for journeys by train in the absence of buses (see Fig. 1). The demand curve for journeys by buses (in the absence of trains) can be derived from this curve as follows. Let $f(v)$ be the frequency function of the value placed upon time, the frequency being in terms of number of journeys rather than of passengers, and let d be the average valuation. Let $f(v)$ be the same at any train fare. Then the demand curve for bus journeys, $P_B R$, is for any number of journeys, d below $P_B R$.

7.44. One case in which the distance between $P_B R$ and $P_B R$ is not constant may arise as follows. Suppose wealthy passengers have a more elastic demand for transport than poor passengers, then

the proportion of journeys made by wealthy passengers on the lower part of $P_B R$ is higher than on the upper part. As wealthy people place a higher value on time than poor people, the average cost of time that separates the two curves will be larger in the lower part of the curves. Thus there results a demand curve, such as $P_B R'$, for bus journeys.

(2) If only one service is allowed, which is to be preferred?

7.45. The service to be preferred is the one which yields a higher consumers' surplus. If, in the simple case where the vertical distance between $P_B R$ and $P_B R$ is constant, the difference between the areas is larger than the average value placed on time saved, then consumers' surplus $P_B R$ is larger than $P_B R'$, and the buses are to be preferred (see Fig. 2).

7.46. This answer does not depend on the shape and position of the cost curves; as long as KL exceeds $P_B P_B$, then the buses are to be preferred. However, if the cost curves are not parallel, then, should the demand for transport change, the relative advantages of the buses and trains will change. Thus, in Fig. 2, the cost curve for train journeys, $C_T R$, is falling and that for bus journeys, $C_B R$, is rising. Should the demand curves, $P_B R$ and $P_B R$, shift to the right, the differential between the average costs narrows, and a point is reached at which the consumers' surplus produced by the trains is larger than that produced by buses. Thereafter the trains become cheaper, and are to be preferred to buses whatever the (positive) valuation of time by passengers.

7.47. Another complication arises if $P_B R$ and $P_B R$ do not preserve the same vertical distance. This makes it more difficult to compare the consumers' surplus produced by the two modes of transport.

7.48. In the rest of this paper it will be assumed for simplicity that the same distance between the two curves is maintained.

(3) The demand curves when the two services are run concurrently

7.49. Suppose the average value of time for travellers is 6s. per hour, then presumably there are travellers who value their time at 0d., 1d., 2d., ..., 1s., ..., 6s., ..., 10s. per hour. Suppose there are no people who value their time at less than 2s. per hour, then, if we set the bus fare at less than 2s. below the train fare, nobody would want to travel by bus (it is assumed that a train journey takes an hour less than a bus journey). On the other hand, suppose there are no people who value their time at more than 10s. per hour, then, if the train fare is more than 10s. above the bus fare, nobody would want to travel by train. Hence, for both services to be running concurrently at a given fare-differential there must be some people who value their time at above that differential and others who value it at below that differential.

7.50. Assume that the fare differential is 4s. and that there are people who value their time at more than 4s. per hour and others who value it at less than 4s. per hour, then the former will all travel by train and the latter will all travel by bus.

7.51. The demand curves for train and bus journeys when both modes are in use, the difference in fares being 4s., is derived from the demand curve

¹Strictly speaking, the vertical distance between $P_B R$ and $P_B R$ is smaller than d since P_B , if some passengers have zero value for time, does not coincide with P_B . Similarly, $P_B R$ gradually diverges from $P_B R$ below the average cost line. However, the two curves intersect at d . This point will be disregarded in the following discussion, and, at Figure 1-3, the demand curves for train journeys and the demand curve for bus journeys derived from it have been drawn so that the vertical distance between them is constant.

when only trains are run (see Fig. 3). P_1R_1 and P_1R_2 add up horizontally to P_1R (see Fig. 1).

7.52. Let the average value of time of those who value their time at less than $4s$, be $3s$. Making a simplifying assumption similar to that used in para. 7.45 above, the demand curve for bus journeys by those who value their time at less than $4s$, is P_2B , which is $3s$ vertically below P_1R_1 .

7.53. From the above assumptions, the demand curves for train journeys and bus journeys, when both are available and the fare-differential is $4s$, are P_1R_2 and P_2B respectively. These will be the demand curves of two distinct groups of people, who differ in their valuation of time.

7.54. P_1R_2 and P_2B are peculiar kinds of demand curves; they are valid only on the assumption that the fare-differential is $4s$. Should the fare-differential change, the curves will change (and indeed one of them may cease to exist).

7.55. Also, P_1R_2 and P_1R_1 , and therefore P_1R , cannot be drawn unless the fare-differential is known. But the train and bus fares are determined by the intersection of demand and supply curves. On the other hand, unless the demand and supply curves are known, the equilibrium fares and the difference between them cannot be calculated. This difficulty is resolved if the cost curves for both modes of transport are known, and, for every passenger, the demand curve for train journeys (in the absence of buses), as well as the value he places on time. The curves P_1R_2 , P_2B can then be drawn either by successive approximation or by resolving a system of simultaneous equations. The problem is easiest when the cost curves are horizontal, as shown in Fig. 3.

(4) Should one or two modes of transport be run?

7.56. To answer this question, the consumers' surplus produced by one mode of transport has to be compared with that produced when two modes of transport are operated at the same time. The question arises whether there is a consumers' surplus in the case of demand curves such as P_1R_1 and P_1R_2 , which are drawn on the assumption of a given fare-differential and which would both shift if that differential were changed. The answer seems to be that there is, since the two curves can be combined to give P_1R in Fig. 1. We are in fact dealing with a single commodity, transport, sold in two forms. We might think of a composite demand curve for transport drawn as follows: for any set of fares p for a train journey and $p-4s$ for a bus journey, plot separately the number of journeys by train and bus.

7.57. We now turn to the question: under what circumstances is it preferable to operate two services at the same time? Assuming they can be run concurrently (see section (3) above), the additional assumption is made that the cost curve for a mode of transport is the same, whether the other mode exists or not. The following cases can be distinguished:

(a) Constant Costs

7.58. If the difference in average costs per journey between trains and buses is less than the average value of time for all passengers, then the order of preference should be (a) two services, (b) trains, (c) buses.

7.59. This can be shown as follows: from section (2), if the difference in fares is $4s$, and the average value of time is $6s$, then, if only one service is

allowed, the train service produces a higher consumers' surplus and is to be preferred.

7.60. It can be shown next that, with the given time valuation and fare-differential, operating two services produces a larger consumers' surplus than operating the train service only. Fig. 3 shows that those who value time at more than $4s$, per hour get the same consumers' surplus as when the train service alone is run (area P_1R_1M), while those who value their time at less than $4s$, per hour get a surplus measured by the area P_2BN . This area is larger than P_1QM , which measures the surplus passengers they would get from travelling by train, when no bus journeys are available. Hence, total surplus is larger than when only train journeys are available. This result follows because P_1R_2 , the average valuation of time by bus passengers, is smaller than M/N , the difference in fares, which is the maximum valuation of time by any member of this group. This is in keeping with the principle that welfare is increased when the production of goods is diversified, costs remaining constant, to meet different tastes.

7.61. It can easily be shown that if the fare-differential, say $7s$, exceeds the average value of time for all passengers, then the order of preference should be: (1) two services, (2) buses, (3) railways.

7.62. To sum up, if there are constant costs, then it is always preferable to have two services than one (subject to the proviso mentioned in section (c), that there is demand for both services).

(b) Rising Costs

7.63. We shall assume such conditions as lead to the railways being preferable to the buses when either service is run without the other (see section (a)). It can then be shown that, under rising costs, to have two services is preferable to having railways only.

7.64. Fig. 4 repeats the demand curves of Fig. 3 (namely P_1R_1 , P_1R_2 , which are the demand curves for train journeys of those who put a high value on time, when both services are available). P_1R is the horizontal sum of P_1R_1 and P_1R_2 as in Fig. 1. We have drawn the cost curves for train and bus journeys, C_1R and C_2B both rising. The vertical distance between Q and S is the fare-differential, assumed to be less than the average value of time for all passengers. P_1P_2 is the average value of time for those who travel by bus.

7.65. To prove that it is better to run two services than to run the train service only, we have to show that area P_1B $W > P_1R_1$ V is larger than area P_1RT :
area P_1B $W > P_1R_2$ $U > P_1$ Q T
and area P_1R_1 $V > P_1$ S $T = P_1$ R Q (for $RQ = TS$).

7.66. It can also be shown, as in case (a), that, if the differential in fares exceeds the average value of time for all passengers, then the order of preference is: (1) two services, (2) buses (3) railways.

(c) Falling Costs

7.67. This case is the most likely one to arise. Let the costs of running the railways be falling, and let the railways be preferable to the buses if only one of these services is allowed, then there are the cases, such as in Fig. 5 (area P_1B $W > P_1R_1$ V less than P_1RT), in which it is preferable to have only the railways than to have two services. This conclusion is more likely to be true if bus costs are constant or rising.

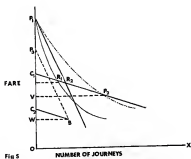
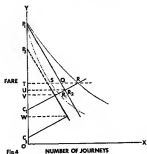
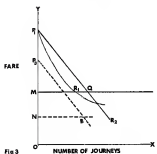
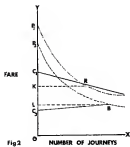
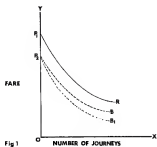
7.68. It can also be proved that if the buses have a larger surplus than the railways when run alone,

and if their costs are falling, then it is possible for them to be preferable to a combination of the two services.

7.69. As mentioned above (section 7.5), when cost curves are not parallel, then we get different solutions with different demand curves for transport. The particular case, which may well apply to the Central Borders is as follows: suppose the average cost curves for both railways and buses fall, but that the average cost curve for the railways though starting at a higher level than that for the buses, falls more steeply than the latter, then the best choice would very likely be the railways alone. This

is, however, a long-term solution. In practice, both services may be running together, and the railways, having a small number of passengers, may be operating at very high costs, so that they need a subsidy to keep them going. Nevertheless, they might be able to drive the buses out of business if they expanded their services sufficiently. In the context of the Central Borders, this may well be the case if the population is increased.

7.70. It should be remembered, however, that the number of passengers differs as between routes. It is very likely that on routes serving sparsely populated areas, buses will remain cheaper than railways.



Geographical Factors

General Considerations

8.1. The Scottish Borders are made up of broad uplands and deeply-cut valleys, lying between Berwick and Carlisle. They are from 40 to 60 miles south of Edinburgh, and 60 to 80 miles north of Newcastle. They form a double divide between well-travelled routes on the east and west coasts, and densely-populated plains to north and south. Such divides are often negative areas, subject to strong pulls away from them to the more positive, better-developed zones on their flanks. The Scottish Borders have certainly felt this pull, and many of their people have left for the Central Lowlands to the north, or the industrialised estuaries to the south. However, unlike most upland borders, they possess wide-floored basins in the heart of the hills, which have cradled fine estates, good farms, thriving mills, and flourishing towns; they have, as it were, a heartland of their own, exerting a counter pull into the region itself.

8.2. Since life is centred in valleys, with broad uninhabited uplands in between, the Borders are very much a congeries of little regions, each with a high degree of independence, although ultimately dependent on each other. A major distinction may be made between a lowland-based area to the east, and an upland-dominated area to the west. The Eastern Borders, as they have been called, centre in the Merse of Tweed, that not inconsiderable basin, from Kelso to Berwick, where hills recede and plain takes over. The Central Borders, by contrast, are the 'land of the Laws', the great flat-topped, broad-shouldered uplands that nurse the waters flowing into the Merse, on the one hand, and to the Solway, on the other.

8.3. From a major height of land, of which Broad Law (2,723 ft.) and Hartfell (2,651 ft.) are the outstanding summits, the land falls away westward to Eskdale and Liddesdale, and eastward to the headstreams of the Tweed. The divide is not a sharp one and the upper waters of the different rivers interlock with each other. Consequently, although the Central Borders are mainly in the catchment of the Tweed, they include Solway and Clydeside drainage as well. Perhaps for this reason contacts with areas just beyond the region, such as Glasgow, Lanark, and Dumfries in the west, and Edinburgh, Berwick, and Newcastle in the east, are almost as important as between the main settlements within the region itself.

8.4. The greater part of the Central Borders consists of the Upper and Middle Tweed, as far east as Kelso, and of the tributaries, Ettrick, Teviot, Yarrow and Gala. The Upper Tweed region is made up of Tweeddale, the Yarrow, the

higher reaches of Ettrick and Teviot, and the great uplands between them. It is mostly unimproved hill country, from 1,000 ft. to 2,500 ft. high, that is, it lies in what corresponds to a sub-arctic climate, with moorlands of *nardus* grass and great peat bogs of cotton-grass and sphagnum moss. Swept by strong winds it is virtually treeless, except in sheltered localities. Exposed to rain, and with a long, cold winter, with up to 45 days of snow lying on the ground, it has been difficult to develop, even for sheep-rearing. Life is concentrated in the valleys. Since the Tweed is made up of a number of broad-terraced straths and narrow gorges, there are open basin-like areas, as for example at Peebles, where shelter from rain and snow, coupled with good drainage, have enabled fodder to be raised for wintering sheep and cattle, forests to be successfully planted, and an altogether more intensive use of land to be practised.

8.5. The uplands are essentially open tundra, which in earlier times formed the summer grazing of deer, and subsequently of sheep. The vegetation is largely *fescue* (*Festuca ovina*) and *agrostis* moorland, along with heather. The feed value is not high, and, unfortunately, prolonged selective grazing together with the traditional burning of the heather, has led to the deterioration of the moorland. The heather is burned to get rid of old, woody growth and encourage the young shoots for sheep pasture, since it constitutes important grazing when snow is on the ground. However, labour is scarce, the burning is often delayed, the heather becomes too old to regenerate itself and is replaced by wiry mat-grass (*Nardus stricta*) of poor nutritive value. Meanwhile, bracken is invading the lower slopes, again partly because there is not the labour to keep it down. Hardy Blackface and Cheviot sheep predominate on these rough grazings, reared on large hill-sheep farms, seldom less than 1,000 acres and often more than 3,000 acres in extent.

8.6. The valleys are marked by improved grasses on the lower hill slopes, stretching down from about 600 ft., and by rotation grasses, hay and fodder crops on the river terraces that line the flood-plains. These terraces are a notable feature of the region, carrying the best cropland, farms and farmsteads, woodland, road and rail well up into the upland block. River bottoms are generally left in pasture, because of the dangers of frost and flood. The only significant area of improved land within the upland zone is found in the Peebles strath, reaching as far east as Walkburn, extending southwards up the

valleys of the Quair and Manor Waters and northward up the Edleston and Lyne valleys. To the west, this improved land joins up with the highlands of Drumelzier, which in turn open out through the Biggar gap to the agricultural belt of Lanarkshire. Since this is the best area in the Upper Tweed basin competition for land is keen: development of industrial and housing areas is at the expense of the best farming or forest possibilities.

8.7. The Forestry Commission have acquired large estates along the Tweed, particularly below Drumelzier, where the Dreva forest vies with the well-known private woodlands of Dawick to begin that lively procession of trees down the river, creating one of the most beautiful stretches of the Tweed. Flanking the Peebles strath are the Forestry Commission estates of Gientress and Cardrona and, below Innerleithen, the forests of Eljibank, Traquair and Yair Hill. In addition, an estate has been acquired at Glenbeek, on either side of the Tweed below and above Tweedsmuir. Altogether about 28,000 acres have been planted out. When the plantations mature they will completely change the landscape of the Upper Tweed and add an important resource to an otherwise limited region. Elsewhere in the uplands, the Forestry Commission have estates at Craik, on the western slopes of upper Borthwick water, and at Wesschope in southern Roxburghshire. Gradually the land may be brought back to that woody appearance which, judging by names like the Ettrick Forest and robes still left of the ancient woodland cover, must once have dominated the scene.

8.8. In common with most upland areas, the Upper Tweed region has a low population, with sparse and scattered settlement made up chiefly of a few big estates, their home farms and tenancies with small riverside cottages and enormous hall-runs; and a number of small villages, such as Tweedsmuir, Yarrow, Ettrick, and Teviothead at the junction of valleys. The only settlements of any size are Peebles and Innerleithen, market and mill towns that help to hold the region together. They are not, however, more than rudimentary service centres and many people go outside of the area to shop and to work. On the other hand, the relative emptiness and openness of the region, together with its beauty, attract many people in, at least as visitors, to find recreation and relaxation.

8.9. Space exists for further development, and with reasonably good roads and short distances to Edinburgh or Glasgow, a feed-back of industry or commerce from these larger, more populous regions might occur. On the other hand, nearness also has its problems, in that it invites flight to, as well as invasion from, these outside regions. Furthermore, there is the problem of competition with settlements still nearer to Glasgow and Edinburgh like Larark, Biggar, West Linton and Penicuik that are anxious to catch the commuter to, and hold foot-loose industry from, the greater centres.

8.10. The Middle Tweed lies between the main upland divide to the west and the fertile lowlands

of the Merse on the east. It is an undulating country, with elongations of low, rounded hills between broadening terrace-lined valleys, showing both in relief and land use a distinct transition between its neighbouring zones. This is really the heart of the Border country, the converging point of routes since Roman times, the centre of the great Abbey communities of the mediæval period, and the focus of industrial development in the modern era. It is the most diverse and populous part of the region.

8.11. While very old, hard, highly-folded and resistant rocks remain dominant in the ridges-lands, softer, more gently-bedded and easily-eroded rocks floor the valleys and these have led to a general lowering of the land and a widening of the lowland areas. Rivers attacking the softer sandstone beds have lowered them and, as a result, the soil creep and slumpage and other forms of mass wastage of the harder hill slopes above have in effect rotted away the ridgelines and reduced the whole region to a low upland corrugated by grooves of high plain. Particular interest is given to the landscape by the abrupt and often craggy heights, the product of volcanic intrusions, such as the Eldon hills (1,385 ft.) near Melrose, the Minto hills (905 ft.) overlooking the Teviot, Rubers Law (1,392 ft.) east of Hawick, and Black Law (1,110 ft.) southwest of Jedburgh.

8.12. Rainfall is only two-thirds of that in the Upper Tweed; the snow lies for only about three-quarters of the time. Thus, the moorlands are not so wet, and the bogs not so thickly developed. Improved grasses climb to 1,000 ft. and even the rough pastures beyond that have a surprisingly good carrying capacity for sheep. Not only the Blackface and Cheviot, but bigger sheep, such as Greyface and Border Leicester, are raised. Moreover, there is a distinctly higher proportion of store cattle than in the true upland zone to the west. The presence of the cattle along with the sheep has meant more even, less selective grazing, more manuring, and consequently, a better state of pasture. The drainage of the moors has also proved more effective, since there are fewer extensive areas of lofty flat-topped land. Bowden Moor, lying between the Eldons and Selkirk, is the only district which, owing to its flatness at the moderately high elevation of 700-900 ft., has become waterlogged and is acid and infertile.

8.13. There is little natural vegetation left: most of the area is dominated by man. Pastures of unimproved rough pasture, mostly *Agrostis* and *Nardus*, are found on the higher hills, like the Eldons and Minto, and pieces of undrained bog occur on Bowden Moor and on the flatish hills east and south-east of Selkirk; but in the main the grasses have been substantially improved by extensive drainage, and by the application of lime and other forms of top-dressing. Woodland is also much more in evidence than in the Upper Tweed; in fact, the middle region has a distinctly bushy appearance, with its tree-lined hedges, its coverts and its shelter-belts, with the ornamental parks around the manor houses of both great and little estates,

and with its considerable plantations. The fox coverts remind one that the Borders is one of the few places in Scotland where hunting is popular. The plantations are usually mixed, but sometimes dominated by summer-green, huge-crowned broadleaf trees like the oak, beech, ash, sycamore and elm. There are notable strands on estates such as Eldon, Bowhill, Minto, and Monteviot. This is very much the landscape of the private improver, and owes a great deal, particularly in aesthetic appeal, to the manor houses which have done so much to adorn it through their policies.

8.14. Since the land is intensively used, producing some of the best stock farming in Scotland, farms are smaller than in the Upper Tweed, averaging 300 to 400 acres, though with a few at 1,000 acres. The Newtown St Boswells sheep sales and the Kelso ram sales have a wide reputation.

8.15. The Middle Tweed is the most densely populated part of the Borders, containing five burghs, of which two, Hawick (16,000) and Galashiels (12,000), are amongst the largest in southern Scotland. With Selkirk and Jedburgh, these centres are dependent upon the textile industry which developed here towards the end of the eighteenth century. That industry itself sprang out of a much older interest in the woollen trade stimulated by the monks of the great Abbey estates at Melrose, Kelso, Jedburgh and Dryburgh. The production of high quality wool in the Middle Tweed was mainly for commerce with Flanders, but, with the rise of mills based on water power, wool-raising became the base for local woollen manufactures. The Abbey sites were in the main not suitable for extensive mill development and the mills, sited at the best centres for water power, helped the rise of settlements further upstream, particularly in the more swift-flowing tributaries such as Gala Water (Galashiels), the Etrick (Selkirk), the Teviot (Hawick) and the Jed (Jedburgh). When the industrial revolution shifted from waterpower to steampower, based on coal, the nearness of these centres to the Lanarkshire and Midlothian coalfields enabled them to make the necessary adjustments. Similarly, as electricity became used, access to coal-fired or hydro-electric generating stations in southern Scotland permitted the mills to benefit by this new source of power. The making of tweed and knitwear thus continued, by a process of successful adaptations, to the present day.

8.16. The Middle Tweed towns have also owed their importance to the command of gaps across the Border uplands. Jedburgh guards the route north from Newcastle over Carter Bar; Melrose, that south from Edinburgh over Souters; Galashiels is at the junction of roads from Edinburgh, using the Horiot gap, and from Glasgow, making use of the gap at Bigger; Selkirk is at the end of the route up Annandale from the Solway lands and down the Yarrow; while Hawick commands access from Carlisle either by Eskdale or Liddesdale into Teviotdale.

8.17. Routes *are* are, of course, also ways *out*;

and towards the end of the nineteenth century the pull away from the Borders began to be greater than the inward pull, and consequently the Borders started to lose population. All kinds of shifts of people occurred, from rural to urban areas and from smaller towns to bigger ones within the Borders, to drifts from the Borders themselves out to the much larger population centres at Glasgow, Edinburgh, and Newcastle.

8.18. It was mainly to see if this drift could be stopped and if ways could be found of maintaining an increase of population in the Central Borders that the Central Borders Survey was made. Since the bulk of the population was urban and since the power to keep population was vested in the cities, the Survey had to devote itself mainly to city development and expansion. However, since city growth must take place in the valleys, which are also the basis for farming and forestry and the home of the great Border estates and institutions, all users of land are involved, and the region should be thought of as a whole. Healthy competition between settlements, especially between those in different valleys, has bred a strong independence among burghs and counties. At the same time, the common use of roads, railways, water, communications, commercial contracts and recreational facilities has brought towns increasingly closer together; and, in terms of modern technology and the general economy, there is reason to think of all the towns as essentially parts of a large, though loosely-made, urban complex, and to plan for that complex as a whole.

Special Considerations

The Physical Geography

Geology of the Central Borders

8.19. *The geology of the Central Borders* has been crucial to their development. It is made up of high-folded rocks which have been weathered to masses of broad-topped, but steep-sided, hills. Most of the rocks consist of thin-bedded greywackes and mudstones rather than massive strata of limestones or sandstones. Consequently, no strong prominent structures stick up in the land to resist erosion. Instead, a lot of narrow beds have allowed erosion to sap them from beneath by breaking the rocks up into small fragments, which have then moved slowly down slope to be washed away by the rivers. Thus gentle, rounded uplands, interspersed with steeply entrenched valleys, have come to dominate the scene.

8.20. All this has had real importance for man. There are unusually wide areas at a high altitude swept by rain-bearing winds, which are ill-drained at the best and often wholly waterlogged. These yield at their edges to rather sharp slopes with a very high run-off. As a result, soil slumpage and gully erosion are all too common. Soil creep, screes, fans at the

mounds of tributaries, fluvo-glacial terraces, and river-laid silts have all flattened out the valley floors, making them pools of cold air in frosty weather, and also inviting periodic floods. In the upper valleys the bottom lands are often in deep shade for much of the year as the lofty shoulders of the plateau-like summits cut them off from the sun. Thus the environment is not propitious; it is one of handicap and challenge, putting men to the test. Under these circumstances the surprising thing is not that so many have left, seeking out the fertile plains of Canada, Australia, or New Zealand, but that as many have remained as still face up to the stern struggle demanded of them.

8.21. When weathered out, the gritty greywackes and slaty mudstones give rise to poor siliceous soils, containing numerous sharp, frost-shattered rock-fragments, which, on the uplands at least, are acid and infertile. On lower ground, to which the finer shaley material in the rocks has been carried, a grey clay is often found, that is the basis for a rather heavy glacial till formed when the ice worked over the valley soils. The clay is slow to drain but is quite fertile where well-managed. As the glaciers wasted down in the waning of the ice age they left flanking terraces of water-worn gravels and sands, which are of major consequence because they stand up, all along the main valleys, as well-drained, warm, productive strips. Outwash fans at the mouths of tributaries are likewise often conspicuous for their well-drained and easily-tilled soils. The fluvo-glacial terraces and outwash fans, while of pre-eminent value for agriculture and forestry, have economic worth for cement-making and other construction purposes. Were it not for their remoteness from the main user-markets in Glasgow, Edinburgh, and Newcastle, they might have been worked to a much greater extent; but they remain as a potential source of construction material should deposits in the Central Lowlands become run down.

8.22. Geology has affected the region in still other ways. It has produced a distinct gaiting to the countryside, following the SSW to NNE 'strike' of the rock strata. This is well seen in the broad bands of Ordovician and Silurian rocks that underly most of the region. The oldest Ordovician rocks form a northern belt some six miles wide which include Culter Fell, the Broughton Heights, and most of the hills striding along Eddleston. They are made up mainly of black shales with variously-coloured cherts. South of them is a belt of upper Ordovician rocks, also of shales, but with greywackes, conglomerates and patches of limestone. The wide central belt of the region, stretching from Peebles to south of Tweeddale, is composed of Silurian rocks, of thin shales and mudstones, separated by sandstones, together with grits and greywackes. Intense folding disturbed these rocks with, again, a SSW to NNE trend to the axes of the folds.

8.23. The result of all this is the strikingly criss-cross drainage of the region. While the main line of the Tweed, as it crosses the Central

Borders, like that of the lower Gala and of Lauder Water, is NNW to SSE, that is to say, across the strike of the land, its headwaters run with the strike, and are paralleled in this by the Yarrow, the Ettrick, and the Teviot. Consequently, the region is broken up into rectilinear blocks where, although the upper valleys are very isolated from each other by long and relatively unbroken ridges, their lower portions are tied in with each other, particularly by the Tweed itself. Thus independence and later-dependence are, as it were, built in, and while the separated burghs have developed strong characteristics of their own they all borrow a certain flavour from each other. Any plan for the region must take account of both these features, that is, of the uniqueness of each burgh, but also of the linked nature of their development, each necessarily bound to the other.

8.24. Towards the end of Silurian times strong earth-movements depressed the lower Tweed into a deep, broad basin. Into this, rivers poured their sands and gravels while on its edges the lava flows of the Cheviot volcanic series formed craggy features. The basin underlying the Merse deepened through Old Red Sandstone times, and dull red rocks are now exposed in the Teviot and Jed valleys and in parts of the middle Tweed. These provided the parent material for a red or reddish-brown till, usually sandy with free drainage, though sometimes a clay loam where drainage is more difficult. The landscape in winter and spring is dominated by the rich red hues of the ploughed fields, while villages, farms and stone walls show the same warm colour. Perhaps the most notable contribution these sandstones have made is as building material for the three mediæval abbeys of Jedburgh, Melrose, and Dryburgh.

8.25. The basin of the Merse continued to widen in the Carboniferous era when it was partially floored by calciferous sandstones and marine limestones. These rocks were relatively flat and helped to broaden the plain as far west as Kelso. Both the Old Red and the Carboniferous sandstones were more readily eroded than the older greywackes and gritstones, and their presence led to a general lowering of the land at the eastern end of the Tweed. The Central Borders have felt the effect of this mainly in the broad open plain between Newtown St Boswells, Ancrum, and Kelso—which is, indeed, the only extensive lowland in the region, offering considerable room, at low and easy gradients, for further development. While all other parts of the region are in confined valleys or limited straths, this forms an open and comparatively wide lowland. It is used by rail and road as the main connecting link between Galashiels and Selkirk on the west, and Hawick, Jedburgh, and Kelso on the east, at the same time drawing in Lauder, Dryburgh and Melrose into its ambit. It is curiously empty of major burgh development because the mill-towns grew up in the swift-water reaches of the rivers above; yet that very emptiness offers an opportunity at a time when it is room not power that is needed, and valley sites, though not yet brimfull are getting crowded.

8.26. The transition between the Old Red Sandstone and the Carboniferous areas was marked by another outburst of volcanic activity. Olivine-basalt flows are found at the base of the calciferous sandstones in the north-east, where they are known as the Kelso traps. Other trap ridges occur near Riccarton and Dinley. Of far greater significance are the abrupt 'necks' of old volcanoes, now standing up as notable crags in Scaw Law, Rubers Law, Black Law and Maiden's Paps. Major intrusions into the country rock were eventually exposed by erosion and stand up in the Dirlington Laws and most striking of all, in the Eildon Hills, whose triple peaks soar a thousand feet above the surrounding plain. The south-west face of Wester Hill offers a good example of columnar structure. Volcanic dykes, as their name suggests, stand up like sharp-sided walls between Melrose and Selkirk.

8.27. These abrupt craggy features make a fine contrast with the broad-shouldered and rounded uplands in which they are set, and that contrast creates some of the finest and most dramatic scenery in Britain. Undoubtedly, the scenery of the Central Borders is one of its major attractions. Every effort in any plan of development should be made to protect and retain this; to provide, if possible, even more viewpoints from which the most striking aspects of the scene can be taken in; and to exploit hills and crags, and the noble sweep of the river at their feet, as the back-drop to whatever housing, road-building, or industrial expansion that may be staged. To work in these surroundings could be a major attraction to people to come and live here.

8.28. Glaciation emphasised and modified many geological features. During the glacial period the Southern Uplands became a main dispersal centre for ice, and the high ground between Ettrick, Yarrow, and Tweed initiated a north-easterly to easterly flow over the Central Borders. The ice tended to follow the grain of the land and thus steepened valleys like the Yarrow and the Teviot; it cut basins in the rock, now filled with lakes, like St Mary's Loch; and it roughened the westward-facing slopes of all the volcanic crags. As the ice climbed over the western faces it slowed up and deposited masses of debris on the eastern slopes and on the valley floors. The main work of deposition was east of Galaherrick, to leave a gently undulating till plain between Newtown St Boswells and Kelso. The gradual wasting away of the ice gave rise to a number of morainic deposits along the sides of the valleys. Meltwaters, often ponded back by ice-blocks, laid down fluvi-glacial gravels and sands. Lakes were left in hollows in which masses of rotting ice had lain, as in the Selkirk district, but most of these have now dried up, leaving fertile lacustrine beds. The ice-moulded landscape has greatly influenced the details of the drainage pattern, making the minor streams follow the broad ice grooves between ice-scraped ridges.

8.29. From every point of view the scenery of the Borders has great scientific interest as well

as aesthetic appeal, and should be regarded as one of their major assets. It certainly adds to the tourist attraction of the region, and helps to draw thousands to visit the area. Insufficient has yet been done, however, by way of creating Nature Reserves or National Parks, or even through the construction of camping and picnic sites, to make the most of this important natural resource.

Climate of the Central Borders

8.30. The climate of the Central Borders is transitional between that of western and eastern Scotland. The upland parts are cloudy and rainy, combing the moisture out of the western air; the lowlands, lying mainly to the east, are drier and more sunny. As altitude increases, more northerly traits appear, with coldness and snow. In the uplands, the climate is challenging, not to say frustrating. In the lower parts it is stimulating, if not rewarding. There are aspects in which it is a handicap, but also an asset. It has certainly been used with great skill and adaptiveness.

8.31. The south-westerly and westerly wind-streams which prevail over Britain as a whole carry a maritime polar air, with cumulus and heavy cumulo-nimbus clouds and with rain, up into the hill masses at the valley heads, but then, as they descend, bring drier and warmer conditions to the eastern plains. Winds from the north also bring showers, although the Highlands usually absorb much of their rain. In addition, the Moorfoots and the Lammermuir offer a certain amount of shelter against arctic airs. This shelter is lost if the wind veers east, and often the heaviest rainfall in the Borders is associated with north-east or easterly winds coming in to nip the warm sector in a depression centred over the North Sea. In winter such winds bring heavy snow.

8.32. Continental air is carried into the area by south-easterly winds coming off Holland or Germany, warm in summer but cold in winter. In January, however, the weather in the Borders is frequently warmer under these conditions than it is at London, since the winds have had a longer passage over the sea and have benefited by the warming influence of the waters. In spring and early summer, south-east winds often result in a coastal 'haze', or sea-mist, that sweeps in as far as Kelso. In the main, continental conditions give fine, settled weather with clear skies and long hours of sunshine.

8.33. The climate is a cool one with average annual temperatures of 44.9° at West Linton and 47° at Kelso, in valley areas. Above 1,000 ft. it is sub-arctic. July, which is the warmest month, has maximum temperatures of only 62-67°. In January and February, all districts show minimum temperatures below freezing.

8.34. Over a thirty-six-year period of observations at Eskdalemuir, it has been found that 29th September is the mean date of the first screen frost, and 27th April the last. In the eastern districts of the survey area, the comparable dates are 15th October and 1st May, but

here, severe frosts seldom occur before the New Year. The hard weather of January and February is welcomed by the arable farmers, for frost is a good pulverising agent on clay soils and makes seeding preparations easier and more economical. The dates of screen frosts cannot be entirely correlated with altitude, for the lower average temperatures of higher situations are offset by the greater fall in temperature occurring in the valleys at night. This temperature inversion, caused by the ponding of cold air in the valley-bottoms, is characteristic of the Borders, and ground frost is liable to occur on clear, quiet nights in the valleys at any time between September and May. This naturally constitutes a severe handicap to market-gardening and fruit-cultivation.

8.35. Temperature has a profound effect upon agriculture, for the all-important 'growing season' is based on the number of days per year when the daily mean temperature exceeds 42°. It has been calculated that Kelso has a growing season of 219 days, Hawick 203 days, the hilly districts around Galashiels and Selkirk (600 ft.-1,000 ft.) 195 days, while the upland areas to the west, lying between 1,000 ft. and 1,600 ft., have only 175 days. Generally speaking, arable farming requires a growing season of more than 210 days, mixed arable and stock 190-210 days, marginal farming 185-200 days, while districts with less than a 185-day growing season are restricted to hill-farming with little or no arable.

8.36. Much the greater part of the Central Borders would really be considered marginal were it not for the fact that most farms have a lowland section with a growing season of over 195 days, in which winter food can be raised and where the stock can find winter shelter. Even so, on many farms, the distinction between struggle and success is a fine one, and makes it difficult for the small farmer to carry on. The tendency for medium to large farms is therefore, reasonably sound (security being bought with space), even though it means a low rural population.

8.37. Temperatures are typical of a cool but relatively equable climate. Without exception July is the warmest month in the year and January the coldest. Although the maximum temperatures for the three summer months of June, July, and August are between 62° and 67° the averages are only in the upper 50s. Moreover, even in the height of summer there are less than 6 hours' sunshine per day. These conditions are scarcely enough for good yields of wheat, which require an average of over 60°, and so the farming concentrates on oats, hay, root crops and pasture. However, extraordinary skill in using south-facing slopes, especially where protected by wind-breaks, has in fact allowed quite a deal of wheat and barley to be raised.

8.38. One of the crucial problems in the region is that these highly cultivated slopes, representing one of the more notable achievements of Scottish farming, are at the same time the very ones favoured by housing, schools, playing fields, and institutions like convalescent hospitals, in the expansion of valley towns. By

contrast, where the valley slopes are long in shadow and are subject to frost, and where, consequently, only pasture or even rough grazing may be found, as, of course, where houses, schools, hospitals, hotels, etc., do not want to be.

8.39. Because climate in general is marginal and because even climate at its best is marginal for the best farming, there is an extraordinary concentration of competition for the warmer and sunnier slopes, especially as the Merse is pinched out and valleys narrow south-west of Kelso and west of Melrose.

8.40. Another source of competition is the struggle by both housing and farming for the driest slopes in what is, in the main, a humid climate. The only reasonably dry area in the Central Borders is in the extension of the Merse up to Kelso, where there is a low annual rainfall of from 25 ins. to 27.5 ins. Floors Castle at Kelso records an average of 25.95 in. These figures are comparable with the best wheat or barley growing areas of the Lothians. But they are scarcely representative. The Middle Tweed area, including the burghs of Melrose, Hawick, Selkirk, and Galashiels, has an annual rainfall of between 30 ins. to 35 ins., while the Upper Tweed, with the exception of Peebles (35 in.) which lies in a comparatively sheltered basin, has rainfall figures between 50 ins. and 70 ins. a year. The rainfall is fairly evenly distributed throughout the year, with most stations recording a main maximum in January and a second maximum in August-October.

8.41. The fact that the climate as a whole is humid, added to the fact that its second rainiest period of the year is at harvest time, has made the search for well-drained slopes of great significance, and has put a high premium on the terrace-lands above the river bottoms and below the upland shoulders and hill tops. As has been shown, there is an astonishingly large amount of level land in what is generally an upland region: so many of the ranges are really like plateaux, with flatish summits, while the valley floors, widened by ice or filled in with sludge from the loose glacial deposits of the hill-sides, are strikingly flat as well. In both upper and lower flats, water gathers, upland mosses and lowland marshes abound (unless modified by substantial artificial drainage), and the soils are wet and acid. But on the fluvio-glacial terraces between, conditions are much better. Since many of these terraces, being of glacial origin, have a slight slope right across them, and since they usually end in an abrupt break of slope down to a lower terrace or to the valley bottom, they are naturally well-drained, and stand out as strips of comparative dryness in an otherwise wet countryside. Consequently, they are extremely valuable for farming, and have become the outstanding sites for farms, motor houses, walled gardens, orchards, ornamental woods, and all that great wealth of contrived beauty and landscape improvement so characteristic of the Border estates.

8.42. These same advantages have made the terraces of the Tweed the main venue of road-

building and urban development, so that, here again, there is intense competition between the established and the newer users of the land. A 'dry-point' geography has grown up, with all forms of settlement striving for the drier localities in what is pre-eminently a damp land. Industry and housing could, of course, use the bottomlands, and leave the terraces to agriculture and woodlands; this would seem to be the most rational way of adapting to the situation, but this would raise the whole cost of housing and industrial development, possibly to the point where it would inhibit growth. In that event, agriculture would not have the enlarged local market it might otherwise possess. Without urban growth, and without a more profitable agriculture, there could be little hope of maintaining population, far less of increasing it. The dilemma is a real one.

8.43. The dilemma is made worse by danger from flood. Because of high winter and autumn rainfalls, coupled with high run-off from steep-sided hills, a good deal of water can accumulate in the valleys. Narrows in the valleys, especially where rivers cut across rock structure, tend to impound the water. The valley-flats enable it to spread out in straths and basins. Thus a combination of climatic and geological factors has led to recurrent flooding in the Central Borders.

8.44. Gorge-like sections are particularly prone, for, as the river enters the gorge, its width tends to be constricted and its velocity increased; as it leaves, these factors are suddenly removed. In this way, there is a possibility of trouble at both ends of the gorge, for it acts as a bottleneck at the upper, and a booster at the lower end. These gorges also mark steps in the longitudinal section of the river—short, steep stretches alternating with open straths of gentle gradient where deposition is encouraged and is often followed by changes in course. The river system in the area is still not fully developed; flooding is an indication that the rivers have not yet adjusted themselves since their valleys were enlarged in glacial times. In the floods of January 1962, it was noted that the Yarrow developed a new course at a point below the Gordon Arms.

8.45. Another contributory cause of flooding is the lack of locks to provide natural regulation to the discharge-regimes of the rivers. In the spring of 1963, when flooding occurred in a number of districts caused by a rapid thaw of snow, Peeblesshire was little affected; this was attributed to the fact that Talla had been at a low level beforehand. Again (in spite of the occasional flood), the fewer sharp alterations in the discharge of the Yarrow, as noted at the Philiphaugh gauging station, are thought to be due to the storage effect of St Mary's Loch.

8.46. Climate, of course, plays the major role in the cause of flooding. Although minor inundations of a purely local nature involving a few river-side fields may occur any year, there are also periodic floods which affect wide areas and cause considerable damage. These major inundations are associated with the abnormally rainy periods which sometimes occur in South East Scotland in August, and they have become

known historically as 'Border Floods'. Within the last twenty years, there have been two such occurrences: the first on 12th August 1948, and the second some eight years later, on 28th August 1956.

8.47. On both occasions, there had been fairly heavy rain for the few days previous to the actual flooding date; the ground, therefore, was saturated when the abnormally heavy fall occurred. In 1948, the Tweed area received a fall of 3 ins. to 6 ins. in 24 hours; rain-gauges recorded some 20–23% of their annual average figure and it was estimated that nearly 400 million tons of rain fell on the Tweed catchment. This heavy, continuous rain started in the early hours of the 12th August, and by 3 p.m. all hill-streams were minor torrents; three hours later, the Tweed tributaries had overflowed in their upper reaches. The worst flooding, however, was in the Lower Tweed area which received the full force of water from the whole catchment. It began at 10 p.m. on the 12th and lasted until 11 a.m. the following day, with the maximum inundation at 3 a.m. The Tweed in Roxburghshire reached levels above any previously recorded; at Kelso, the combined waters of Tweed and Teviot were 17 ft. above normal readings for this time of the year and 6 in. above the previous highest figure (in 1832).

8.48. The floods of 28th August 1956 were not so devastating, although again much damage was done. The rainfall within the relevant 24-hour period was not quite so heavy as in 1948—2 ins. to 4 ins. compared with 3 ins. to 6 ins. The Tweed/Teviot confluence area was inundated and the Tweed rose some 8 ft. above normal. There was widespread flooding of low-lying haughs in the Upper Tweed valley (just north of Drumclog, for example). The middle and lower tracts of the Teviot, Lething, Eddleston and Gala were flooded, involving a good deal of town property at Hawick, Galashiels, Peebles, Melrose and Jedburgh.

8.49. Apart from these major inundations, minor floods often occur during the first three months of the year, caused by a rapid thaw after snow—especially if the thaw period should include rainfall. The snow acts as a water reservoir whose contents are too quickly released with a sudden onset of milder weather. If, as in the hard winter of 1962–3, the streams are wholly or partly frozen over, the breaking ice aggravates the situation by causing blockages. Fortunately, floods of this type are mainly local in character, often caused by the failure of small burns, field drains and blocked culverts to cope with the increased discharge.

8.50. Certain districts within the area are more prone to flooding than others. Here, flood-banks have been built at danger-points. Confluence areas are often affected, especially when the meeting of major rivers is involved—the Ettrick-Tweed confluence at Sunderland Hall, the Gala-Tweed, and particularly the Teviot-Tweed just above Kelso. Haughland in the lower sections of the major valleys is naturally liable to an accumulation of flood waters, especially along the Tweed, Teviot, Ettrick and

Yarrow. Unfortunately, the frequency of this flooding means that valuable alluvial soil is often withheld from the plough, since the use of these highlands for anything but grass can be very precarious.

8.51. Occasionally, sections of road adjacent to flood areas have to be closed for a time, but the closures are of a temporary nature and flooding does not cause prolonged disruption to communications. Perhaps one of the worst-hit sections is on B712 at Duryck, where there are permanent flood-warning notices up. The road at Crailing is sometimes covered, as is the A699 at Springwood Park, Kelso, the A708 at Philiphaugh near Selkirk, and the Galashiels-Selkirk road at Sunderland Hall.

8.52. In this region of mill-towns, which, in their dependence upon the river and in the generally restricted nature of the site, hug the river-banks closely, it is inevitable that town property should be affected. Peebles is a case in point where low-lying property is flooded when the Tweed runs abnormally high; the ground floor of the War Memorial Hospital has been under water and patients have had to be moved to find temporary refuge elsewhere. A notable flood occurred in Hawick when the Slitrig Water rose over 20 ft. in two hours, sweeping an entire street 'from its foundations', destroying a corn-mill and the parish school and killing two people. In recent years (November 1963), considerable damage was caused in the Town-foot centre of Jedburgh through the overloading of field-drains and small burns by heavy rain following snow.

8.53. If the towns were to be expanded, either to improve existing conditions and relieve pressure on areas already too densely developed, or to make room for additional population, it would seem sensible to avoid all areas liable to flood. But this could only be done if the 'dry-point' sites on the valley terraces were to be taken over. Their take-over would then mean the loss of some of the finest agricultural land and the overshadowing of some of the best-known private estates in southern Scotland.

8.54. The difficulty of adjusting the claims of the various users of land to each other is very great. This is inevitable and inescapable in such an environment. Yet unless some more effective adjustment is made, the reaction of many people may simply be to leave the region. If the estates cannot provide more work—and some have been unable to offer enough even to keep their existing work force far less to maintain population increase—people will drift into the towns. But if the towns cannot effectively expand, and take in the slack from country districts while giving scope for their own numbers, people will emigrate from the region altogether. In that event there may be a general run-down of the area, affecting everyone concerned. Thus, the problem involves everyone and must be faced by everyone.

Population and Settlement

8.55. For many years the rate of depopulation within the Borders has been a matter of grave

concern. The Central Borders have lost a fifth of their population in the last sixty years, and the rate of decrease has not yet slowed down.

8.56. Depopulation is, of course, characteristic of many upland areas in Western Europe, particularly where much of the land is marginal. Farmers have cut down their outlay on the more marginal parts in a more rationalistic appraisal of the land. The mechanisation of so much of their work, and increased efficiency in breeding both crops and animals, have reduced the demand for labour, and this in turn, coupled with greater economic and social scope in the towns, has resulted in a continuous drain of people away from the countryside. Of course, farming itself has improved, but the loss of farm population has led to the closure of local schools and churches, and thus affected the social structure and life of the community.

8.57. Urban population has also decreased, and even though this has been at a slower rate than in the lowland areas, it has still led to an appreciable loss. The situation is aggravated by a low fertility rate (the lowest in the country) and a comparatively high mortality rate, with an unbalanced age structure. Continuous migration lowers the birth rate by taking young people away from the area. As a consequence, the four Border counties sustained a higher percentage loss (6.3%) during the last intercensal period (1951-61) than any other region in Scotland.

8.58. The two main themes of the area's demographic history have been the fluctuation of the hughal population after a striking rise in the nineteenth century (associated with the textile industry), and the steady decline in the rural population ever since 1860. At the beginning of the last century the total population of the Central Borders was nearly 43,000. Although within 60 years the rural part began to flag, the urban part kept climbing until 1891, when a maximum of 92,500 was reached. Since then there has been a general falling off, and the 1966 estimates suggested a figure of just over 73,000—or nearly a fifth below the maximum.

8.59. Lowland and hugh returns were first differentiated in 1841 and, at that time, the rural population far outweighed the urban, constituting some 70% of the total. All the rural parishes showed increases from 1801, reflecting the benefits of the Agrarian Revolution with its improved farming methods and the general prosperity of village crafts. However, most parishes had attained their maximum populations by the turn of the century for, with the introduction of new machinery such as the reaper, the demand for agricultural labour was much reduced. This, coupled with the increasing attractions of urban life, started the decline in lowland populations which has been continuous ever since.

8.60. During the last 100 years, the urban population has provided the dominant theme, the total population figures reflecting the trends set up by the eight hughes. From the mere 30% representation in 1841, the hughes had so

expanded within 50 years as to constitute over 62% of the total population; numerically, they more than trebled their aggregate figure. This, of course, was a period of great industrial expansion, when the old Border textile manufacture was built up into the industry we know today. In 1841, Hawick was a town of 5,770; within 50 years, the burgh had increased its population by 233%. Knitting frames had been introduced into the town from the Midlands towards the end of the eighteenth century, and later on the hosiery branch of the woollen industry became developed most energetically. The expansion of Galashiels was even more phenomenal; within the same period, it increased its 1841 population of 1,695 by 918%. There had been weavers in Galashiels in the seventeenth century, but it remained a village until the new machines of the nineteenth century transformed it into the accepted centre of the Border woollen industry, specialising in the making of cloth—particularly tweeds.

8.61. When mill sites became scarce in Galashiels, several firms moved out to Selkirk. This ancient burgh was very similar in size to Galashiels in 1841, but in spite of the new industry, it had little more than trebled its size by 1891. Peebles and Inverlathen prospered with the opening of textile mills higher up the Tweed by the Ballantyne family. Melrose remained small, not even doubling its population while neighbouring Galashiels was expanding so rapidly. Jedburgh and Langhols, two other textile towns of comparable size in 1841, showed small increases until 1881.

8.62. The prosperity of the burghs during the twentieth century has, with certain notable exceptions, fluctuated with the fortunes of the dominant textile industry. It is indicative that the two main centres attained their maximum populations before the close of the nineteenth century; since that time, Hawick has fared somewhat better than Galashiels, losing 15.6% of its 1891 population as against the latter's 20.8%. Peebles, although another textile town, has preserved a small but steady increase in population since 1901, actually reaching a maximum figure in 1951. This has largely been due to the burgh's popularity as a residential centre, especially among retired people. The other 'retirement' burgh, Melrose, has maintained a steady population level this century; the most recent estimates give it a population of only 10 below its highest ever figure.

8.63. Jedburgh has shown the healthiest trend of all the centres in recent times. Having reached a nineteenth-century maximum in 1881, its population declined with the recess in the textile industry until the late 1920s, when the introduction of new industry (North British Rayon Co.) brought renewed vigour to this ancient burgh; it actually attained its highest ever population in 1951. Although this firm had to close down in 1956, the burgh set about attracting new industry to use the existing labour force, and the 1966 estimates show a slight upward trend in the population figures.

8.64. Comparisons with the situation in

Scotland as a whole are interesting, since they show that what was happening in the Borders also occurred in South West Scotland, in North East Scotland, and in the Highlands—all of which grew till about the end of the century and then lost population in favour of the Central Lowlands of Scotland. In 1801, the Border Counties contained 4.9% of Scotland's population. In spite of an absolute increase up until the end of the century, its relative share of Scotland's total fell to 3.7% in 1851, 2.4% in 1911 and 1.9% in 1966. The Central Lowlands of Scotland increased their share in the same period from about two-fifths to nearly four-fifths of Scotland's total.

8.65. The present situation in the Central Borders is that there are 73,147 people (1966 estimate), representing 1.4% of Scotland's total. This is a drop from the 1961 figures which showed 75,025, although, since mid-censal estimates are more comparable with resident than enumerated population, it might be fairer to quote for 1961 the resident total of 74,527. Even so, the trend is still down.

8.66. Within the Central Borders, population continues to shift from farm to village, from landward to burgh districts, and from smaller to larger burghs. There is also the drift from the region as a whole to outside parts.

8.67. In the 1966 estimates, Selkirkshire had only 13.4% of the people in the landward areas as compared with 36.6% in the burgh districts. That part of Roxburghshire in the Central Borders was also highly unbalanced, for, although 36.3% of the people lived in landward areas, 63.7% were in burghs. The figures for Peebles County were 43.1% landward and 56.9% burghal. For that part of Dumfriess County in the region the figures were 49% and 41%.

8.68. There is, therefore, no question about the tremendous importance of the towns to the region, and the necessity to plan the region about the towns. If it is deemed desirable to stem the drift outside and try to maintain if not increase the population of the area, then it is essential to concentrate on the needs and opportunities of the towns. If there should be a debate about the use of warm sunny slopes or dry well-drained valley terraces, or access free of flood, frost or snow, or simply about room for growth, then, in the interests of the region as a whole, the answer must be in favour of the towns. Everywhere in the Central Borders the landward areas are shown as incapable of keeping their population, and the landward parts are decreasing both numerically and proportionally. On the other hand, although the burghal population in general is also decreasing numerically, it is increasing proportionally, and now accounts for 68% of the region's total, which is the highest proportion to date.

8.69. When a closer scrutiny is made of the landward areas it is seen that even there more and more people are clustering together into large villages which approximate towns, and that the estates, great or small, and the farms, have less and less significance as a basis for

Border settlement. In Roxburghshire, 15% of the total population live in the larger inland settlements of St Boswells, Newtown St Boswells, Newcastle-on-Tyne, and other villages. If this were subtracted from the so-called rural population, it would leave only 21.3% living in hamlets, on estates and farms. Similarly, in Peebles County, 16% of the people live in villages—two of them, Walkerburn and West Linton, being almost small towns—leaving only 27.3% as strictly rural. If, in the region as a whole, we add the large villages to the towns then the amount of people living close together, on what may be essentially regarded as urban land, will total over four-fifths of the whole.

8.70. In fact the Central Borders are more the work of town growth than any other part of the Southern Uplands, and the maintenance of town life is of the utmost importance to them. Origins may be traced back to the medieval religious communities who pioneered the sheep-rearing economy which is still so important today. Working with wool started out as a domestic industry: in the seventeenth century every village had a few hand-loom weavers. In the next century water power began to be used, and the Borders became a region of comparative advantage for the textile industry. Plentiful water, an abundance of wool, and nearness to markets, together with strong local initiative, soon made industry more important than agriculture.

8.71. Initiative expanded to embrace linen and cotton manufacturing. Linen weavers had been incorporated in Melrose as early as 1668, but it was not until after the Union of 1707, when Parliament provided welcome aid, that the industry expanded and became mechanised. In 1783 Hawick began to make (linen tape) manufacture. Selkirk followed suit, and Peebles established a flax mill. However, by 1830 the industry had declined in face of successful competition from Fife and Forfar, which became the main Scottish centres.

8.72. Initiative then passed to the cotton industry. But although several looms in Melrose were employed in weaving cottons brought in from Glasgow, and cotton-weaving was also tried in Peebles, little success was achieved. A more ambitious attempt was made at Langholm where a new settlement was made at the confluence of the Esk and Wrechope, known as New Langholm, to house the workers. Yet in 1835, only 100 people were employed.

8.73. The region came to concentrate more and more on woollens. New machinery and techniques were applied to making woollen goods. Stocking frames were introduced to Hawick in the 1770s and became the basis for a specialisation in hosiery that has continued to the present. By 1838, over 1,200 frames were in operation and a considerable number of women were employed also in sewing the stockings. The New Statistical Account mentions 11 factories within the burgh, one steam-driven, besides the buildings housing the stocking-frames, while 1,788 operatives were employed. By the end of

the nineteenth century hose-making was matched by tweed manufacturing. In this century, knitwear has gone ahead, with the making of fine underwear, cardigans, and woollen dresses and 'twin-sets'. There are now 3 hosiery, 6 tweed, and 17 knitwear factories employing 5,840 operatives.

8.74. Galashiels, meantime, concentrated on making woollen cloth. Its weavers had formed themselves into a corporation as early as 1666. But it was not until the end of the eighteenth century that 'three machines with 30-36 spindles each' were introduced, and effective manufacturing began. The use of water-driven power looms in the 1830s led to quantity production of blankets, serge, and grey and blue cloth for working-clothes. These were replaced in the nineteenth century by a more varied cloth, formed by twisting together different coloured yarns, which came to be known as 'tweed'. The railway entered the town in 1849 and brought coal for steam-powered operation.

8.75. The constricted nature of the Galashiels' site resulted in a scarcity of space for mill development, and room for new manufacturing was sought in Selkirk, Innerleithen, Walkerburn and Peebles. Jedburgh had meanwhile added the making of blankets, carpets, and hosiery to the working of leather and to iron and brass work, to become a centre of more varied industry.

8.76. Most of these towns reached their maximum population in the late nineteenth century (Hawick with 19,204 and Galashiels with 17,252 were at their height in 1891). After that they began to feel the growing competition of Edinburgh and Glasgow. Many of their people used the railways, and, in this century, motor routes, to the bigger outside centres for shopping, certain kinds of business transactions, higher education, and recreation, thus undermining the influence of their own services and facilities.

8.77. Although the Central Border towns were in decline, they were declining less than the region as a whole, and actually came to dominate the region and mean more to it than ever before. Thus they have had, and still possess, a crucial significance; if, as the most effective parts of the region, they should decrease still more, then the Central Borders would indeed become run down.

8.78. It is, then, essential to find room for their expansion. This can be done in one of two ways: (i) intensification of land use in the existing burghs, which would involve considerable urban re-development; or (ii) absorption of fields, woods, and waste land, necessitating an impingement upon Border farms and estates. Both means are now in operation, although the chief way of solving the competition for space has appeared to be flight out of the region!

8.79. Since the region as a whole is one of exceptional beauty and since this beauty depends to a large degree on maintaining its fields and woods, many of which, as has been shown, represent the finest in Scottish farming and

estate development, it might well be argued that the main way of making space for people would be to use the existing space in towns and villages much more fully and effectively. It could be claimed that none of the towns had a high density, except Hawick (which has 13.1 persons to the acre). The other towns range from 4.3 in Melrose, through 6.8 in Jedburgh, 7.4 in Galashiels, 8.3 in Selkirk, to 9.2 in Langholm. However, these figures are not low in terms of national averages for towns of their size, which are 11 persons per acre for burghs of 10,000 and over, and 6 for burghs of less than 10,000. Nor are the densities low in the context of modern town planning which is anxious to give people more light and less noise, and which needs space to separate vehicular from pedestrian traffic, meet parking demands, and conserve open areas for recreation.

8.80. One would like to think that in the resuscitation of the Borders the historic interest, beauty and character of its famous towns could be kept and that town expansion could be made not so much by tearing down and rebuilding the existing places, which have such fascinating and dramatic lines, but by extending out into the country and devising attractive townscapes there representing the best in contemporary planning—townscapes which would, of course, be landscaped into the magnificent backdrop of fields and woods, valley and hill.

8.81. Several difficulties present themselves simply in intensifying the use of land in the cities. To do so would mean (a) further use of the low lands which are ill-drained, which are frost-bellows, and in which smoke and other atmospheric pollution lies; (b) a further climb up the steep slopes, with high cost of access, construction, and maintenance; and (c) an increase in the already considerable length of the towns by elongation up and down the valley, thus substantially increasing the traffic problem, particularly that of through traffic. The new developments would tend to be piecemeal, they would be difficult to fit into the town as a whole, new shopping areas would certainly compete with the down-town shops and businesses, and new industrial estates might well lead to a flight of people, facilities, and established mill sites.

8.82. Moreover, since these new developments would be in towns dominating separate valleys, and cut off from each other by significant ridges, they would tend to be independent of each other and to compete one with the other, thus frustrating attempts at planning for the region as a whole.

8.83. In terms of the whole region it might be better, therefore, to take in new land, more or less together, in a part of the region such as Newtown St Boswells, readily accessible to all the Central Borders, and with the room not merely for expansion, but for expansion planned as a major unifying enterprise.

8.84. That something should be done, and done soon, may be argued from other aspects of the population. There is a marked imbalance in the sex and age proportions in the region. In

the Central Borders there are 113.9 females per 100 males, compared with the national average of 108.6. The counties of Selkirk and Peebles have the second and third highest ratio of females to males in the country. This is partly because the local industries keep the girls but have less to offer to boys, and so there is less female emigration than male; and partly because, in attracting older people to retire in the region, more old women come in than men, or more women amongst retired married couples survive than the men. In any case, the Borders do not provide enough opportunity for men, who are leaving in increasing numbers.

8.85. The age structure has now also become unfavourable over the region as a whole; only 22.6% of the population are under 15 years of age, as compared with the national average of 25.8%. There is an even greater discrepancy in the age-group of 65 years and over, which accounts for 14.7% of the population, as compared with 10.5% for Scotland. Thus there are both fewer children and more old people in the region (that is, a greater number of economically dependent or non-productive people) than is found in the country as a whole. These general characteristics in the age-groupings are more exaggerated in the burghs where only 21.7% are children, while 15.6% are over 65.

8.86. Many factors help to account for this, of which one is the low fertility rate. This is lower in the Borders than for any other region in Scotland. For all ages under 45 the fertility rate in the Borders is .055, as compared with the North, the next lowest with .061. The mean family size is the lowest in the country and the proportion of non-childbearing women, the highest. This is doubtless partly an outcome of, because an asset to, the textile trade which employs not merely a lot of women but, significantly, a lot of married women. In Hawick, in 1961, out of a total of 3,810 economically active females, 1,820 were married. In Galashiels, of a total of 2,480 women employed in industry, 1,080 were married. These conditions may suit the textile industry, but they may not be helpful to other industries that might be attracted to the region, or to the construction industry, which would be involved in any major schemes of development or redevelopment. Nor do they help in counterbalancing the drift of population from the region.

8.87. This drift is appreciable and has been going on for an appreciable amount of time. Since 1901 the total population of the Central Borders has been decreasing, in large measure as a result of emigration. Consistent decreases in the rural area throughout this period were offset by increases in the towns up to the end of the Second World War. During the last inter-censal period, 1951-61, the population as a whole dropped by 4.7%, the highest percentage decrease since the close of last century, in which all parts suffered. The returns from every county showed a decrease.

8.88. The 1966 quinquennial estimates suggest that there is little change in the situation. True,

Hawick and Melrose are estimated to have had slight increases in population, but Selkirk and Langholm were decreasing at a greater rate than before, while Galashiels had lost twice the number of people it lost between 1951 and 1961. Decrease has continued throughout the area, though in a more uneven way than before, and at a slightly lower overall rate (-37% p.a. as compared with -47% p.a., 1951-61).

8.89. Decrease in the population of the Central Borders is partly due to (1) a low rate of natural increase, as a result of an above-average number of elderly people involving a high death-rate, and (2) a low birth-rate, connected with an unusually low fertility amongst married women, many of whom go out to work in the textile industry; but decline also results (3) from emigration. In the three counties of Roxburgh, Selkirk, and Peebles, which cover the bulk of the Central Borders, the loss of population by 1961 was 6% of the 1951 population. This was higher than in the Crofting Counties of the Highlands, (5.3%), generally regarded as suffering the most from depopulation, and was distinctly higher (i.e. worse) than the national average of 4.9%.

8.90. This is the heart of the Border problem: it has been losing population for nearly eighty years, and is now losing people to a higher degree than most other regions. This loss is mainly in terms of its intellectually most creative, economically most productive, and physically most generative group of people.

8.91. It has been reckoned that of all the migrants, 25% have moved to Central Scotland, and 38% to other parts of the United Kingdom. Hence the Borders are helping to build up the rest of the country, even if at their own expense. These trends may, of course, be accepted on the grounds that what is a loss to the Borders is a gain elsewhere, and that as long as Central Scotland and Northern England are benefitting no real loss has occurred. This is the sort of argument that has been put up about Scotland and Northern England which, like the Borders between them, are also losing people, albeit at not such a great rate. If the loss from Scotland and North England helps to build up Metropolitan Britain, it may be no loss since, if Metropolitan Britain continues to maintain its place as one of the great growth-points of Western Europe, then the prosperity it brings to Britain will eventually be fed back to North England and to Scotland.

8.92. That argument has not, in fact, been accepted. Most parts of North England and of Scotland have been designated 'Development Areas', into which a considerable portion of the capital investment and economic and social development designed for Britain as a whole will be directed. In the same way, and for the same reasons, something might be done within the context of Northern Britain for one of its most difficult areas, the Borders.

8.93. Unless something were to be done the region could suffer much more, for the truth is, as a declining area it is in competition with other

declining areas. Drowning men are notorious in showing little respect for each other when trying to save themselves. Central Scotland, as a region in pretty desperate need of saving itself, has already drawn off a lot of the skills and much of the enterprise of the Borders. Northern England is also anxious to save itself from serious decline, and has put in its bid for the really productive element in the Border population. Unless the Borders can generate a sufficient pull into itself to offset these strong pulls north and south to its lesser surrounds, it may well fall apart, to find its future simply as a pastoral enclave in an industrial world or as the playground and retreat for its wealthier neighbours. If that were to be its future, if it should content itself with being as it were the hunting lodge and fishing club for its more successful relatives—a sort of huge holiday camp for Edinburgh, Glasgow and Newcastle, then, presumably, it would let its industries run down, it could see its towns standing still and changing into centres of retirement, and it should ensure that its more element parts, its sunniest slopes, its warmest and most sheltered spots, its most serviceable terraces and its loveliest prospects of hills and stretches of water were kept clear of factories, transport terminals, and housing schemes to be free for the continued enjoyment of the thousands of visitors who love the region.

8.94. This could, of course, be a satisfying future and one that would call for the best in landscape design for rural development. The tourist trade would become the main wealth of the Borders coupled with the region's worth as a place of retirement. Much more would have to be done for the tourist. The drive along the Tweed would entail making parkways of the roads; large lay-bys for a much increased motor traffic, and big picnic grounds and extensive caravan parks would have to be built. View-points, from which to see the best of the scenery, both in the country and in the town, would have to be provided, with large car parks, public utilities and restaurants. Access to the river and to the hill would have to be ensured for hikers, and the lakes and reservoirs and state forests be opened up for recreation. Parts of the Tweed or its tributaries might be flooded to make lakes for yachting or motor-boat racing. More and better hotel accommodation would have to be provided, with central heating, and with extended meal hours. Heated swimming pools, dance halls, bingo halls and bowling alleys would need to be built, especially for the many rainy days when people could not get out. Employment in towns would have to switch from factories to operate these many recreational services. New types of factories might spring up to make ski suits, parkas, tents, caravans, skis, fishing gear, guns, and all the paraphernalia of the modern holiday-maker, as well as to provide hotels, crêpes, and sports' centres with their many supplies.

8.95. However, these adjustments might take longer to plan for and make, and might need even more co-operation from farmers and estate-owners, since they would be spread more widely,

than developments starting from the existing industrial strength of the area and concentrating on factory growth and urban expansion.

8.96. The truth is, some change would seem to be necessary. To carry on, as things are, would simply lead to the general decline of the area, in which all aspects of the region would suffer. Doubtless, all aspects of the region would like to share alike in any plans for development; but since some of the needs are quite incompatible, this is impossible. The best parts of the region are sometimes best for diametrically opposite purposes; they may be desired by both industry and agriculture, for example, or by housing 'estates' and private estates and their policies. Consequently, some users will have to yield to others.

8.97. If this element of competition were to be allowed to increase by planning a scattered—perhaps one should say a spattered—urban and industrial growth, with some development in each valley, then towns and country would continue to be at odds: if, on the other hand, most of the development were concentrated physically in an area reasonably accessible to the region as a whole, it would restrict the occasions for conflict. Necessarily, such a concentration would take up a lot of non-urban land in that particular area, but it would save good farmland, estate-land, woodland, recreational land and land that ought to be reserved for nature conservancy elsewhere. It would at the same time permit planning the new, without radically altering the old (in the better and more fully-established areas). The effects of such new growth would, if the centre were wisely chosen,

then go back up the valleys to each of the existing settlements. In time, these settlements themselves might take on new institutions serving a wider than local need, and thus be tied in with each other more than at present. The region would really have a chance to function as a region and not as a collection of separate, though juxtaposed units. Since the Tweed collects together the major tributaries of the Central Borders above Kelso, and since there is a relatively wide plain here, which has the best climate in the region and more room for expansion, it would seem logical to generate new growth around this nucleus, between Newtown St Boswells and Kelso, and then, by improving the already good connections up Tweed, Teviot, Jod, Etrick, Yarrow, Lauder and Gala, to knit the whole of the Central Borders together in a series of physical, economic, and social development.

8.98. It would then be seen that over the region as a whole there would be sufficient use for most of the existing users, and it would be quite feasible to devise plans for forestry and farming, for private estates and public housing schemes, for recreation and industry in a balanced, if not equal, way. Not too much should be expected of what is mainly an upland region, much of which is marginal. However, by choosing the few sites critical to industrial expansion, and proceeding from these to the sites needed by housing and institutions closely associated with industry, it should be possible to reserve very adequate sites for agriculture and forestry, and to make room for recreation and retirement in what could be a region of great variety and infinite fascination.

FIG. 8.1
CENTRAL BORDERS: POPULATION—BURGHES. 1801-1961

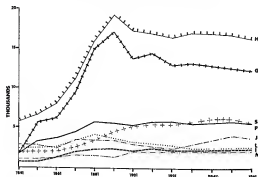


FIG. 8.2

CENTRAL BORDERS: POPULATION 1801-1961

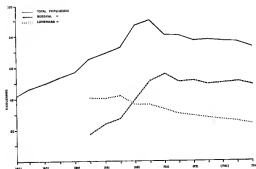
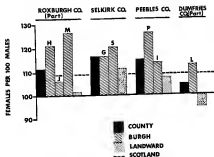


FIG. 8.3

CENTRAL BORDERS: POPULATION RATIO OF FEMALES/MALES



Conclusions

9.1. It is not easy to summarise a work of the present sort. Much of our energy has gone into the theoretical studies that form a necessary background to work in a new field, like the economics of planning and development. A good deal of our energy has gone, as well, into the provision of detailed descriptive material suitable for incorporation in the work of the physical planning consultants. Nevertheless, certain fairly clear practical results do appear to emerge.

9.2. The first of these is our conviction that in the Central Borders, and in similar areas throughout Great Britain, it may be possible to make out a case for government intervention on behalf of a policy of economic expansion. This conviction is, however, a guarded one. It is not our view that a policy of government intervention is desirable in each and every such case. On the contrary, we believe that the case for government action must be made out separately for each separate instance. An acceptable set of rules for deciding between different examples must be developed as quickly as possible. This will require substantial research and considerable public discussion.

9.3. Secondly, we conclude that the Central Borders area is so far below what could reasonably be considered to be an economically viable size in terms of population, that it would not be practical to attempt to raise the population to that level within the foreseeable future. We have taken the viable level of population to be something in the order of 250,000 people. In our view the most that should be attempted is a holding operation designed to ensure a modest level of economic prosperity in the Borders for the time being. The future economic position of the Central Borders can only be determined, in our view, along with that of many similar areas in Great Britain, when the economic position of such small and relatively isolated pockets of population is further determinable as a result of development in transportation media towards the end of the century. In our view, the upper limit set to population commitments in the Central Borders is fully justified.

9.4. We conclude that the economic future of the Central Borders will depend to a considerable degree upon the development of transportation facilities between the Borders and Edinburgh. We recognise, however, that the expansion of these facilities is likely to depend upon the complete economic evaluation in cost benefit terms of the media. It is, however, our view that such cost benefit considerations should not be restricted, as is often the case at

present, to considerations of time and accident loss, but should embrace as well the total impact of any proposed improvement in transportation services.

9.5. While we recognise the incompleteness of present methods of determining optimal industrial and population location, we feel that certain conclusions do appear to emerge, in the case of the Central Borders. These conclusions depend upon the premise that a policy of extensive redevelopment of existing towns in the Central Borders must be excluded under present financial conditions, and that in practice it is possible, both politically and economically, to postpone such redevelopment into the indefinite future. On this basis we feel that the proposals put forward by the physical planners represent a sensible and practical compromise between different economic goals. They offer some degree of economic stimulus to existing Border communities; they also offer new housing and new pools of labour as a means of attracting new industry into the Central Borders. They offer a reasonable degree of concentration in the provision of infrastructure in the area.

9.6. Given the decision to create a modest sized community in the Central Borders, location in the Newtown-St Boswell's area appears sensible. This is true both for reasons of geographical and historical concern, and because this site offers the considerable economic interchange, both of labour and of goods, consistent with the existing transport structure in the area. To this must be added the economic advantages of lower construction costs and of lower cost water and sewage facilities on the relatively flat land involved.

9.7. Should economic circumstances change sufficiently over the next decade to make the total redevelopment of Hawick and Galashiels a possibility, it might become sensible to review the locational conclusions set out above.

9.8. It is suggested that a careful system of reappraisal and review be established for the development of the projected plans for the Central Borders. In particular, the completion of the first phase, involving extensions to existing settlements, affords a suitable point for consideration of the extent to which the Central Borders has become industrially attractive through the pursuit of this and other Government policy. Great success in attracting industry might indicate the wisdom of further extension of housing and service provision planned for the area of new settlement around Newtown-St Boswells. A less considerable success in attract-

ing industry might involve a more radical re-thinking of economic and physical planning policy for the Central Borders.

9.9. Our study has emphasised the difficulties faced by the Central Borders area through its concentration in relatively slow growing sectors of the national economy. We have noted too the difficulties inherent in so great a degree of specialisation. These points suggest the great importance of inducing new industry to enter the Borders. In so far as possible diversification should be an aim of this policy which should emphasise high wage and high growth sectors. Light engineering might be particularly advantageous to the Central Borders in this context. It must be recognised, however, that present instruments of policy do not allow much room for detailed selection of incoming industry.

9.10. The importance of providing an adequate stock of houses suitable for private ownership can hardly be overstated. The provision of zoned and serviced land for this purpose must have a high priority.

9.11. The closing of the Waverley line between Edinburgh, Galashiels and Carlisle would certainly have an unfortunate effect upon the fulfilment of planning targets in the Borders. This is particularly true of the loss of the link sector between Edinburgh and Galashiels.

9.12. Educational facilities, and particularly technical training facilities, in the Central Borders will require reconsideration and review in the light of population and industrial development in the Central Borders over the next decade or two.

A Final Word

9.13. The role of the economist in planning is only now beginning to become clear. This is hardly surprising, since the inclusion of the economists in planning teams is a relatively recent phenomenon. In the first studies it appeared that the role of the economist was merely to provide an account of the economic difficulties and potentialities of the region studied. At a second stage a more ambitious economic survey was attempted, but the work of the economist remained rather distant from the concrete decisions of the physical planner,

whose considerations—largely of a design character—were influenced only in some subjective way. The present study is concerned with pioneering a third stage in which the land-use decisions of the physical planner are constrained within the limits set by the economist. There is a fourth stage, still partly over the horizon but clearly soon upon us, when a much larger part of the whole design problem will be treated as primarily an economic problem.

9.14. Hints of this fourth stage appear in the present study—albeit in a still rudimentary form. It is first to be found in the discussion of the so-called 'threshold analysis'—treated in greater detail in the coexistent physical planning volume. Secondly it appears in the discussion of the wider application of cost benefit analysis to choice of sites.

9.15. 'Threshold analysis' deserves some attention as a forerunner of the coming technical-economic innovation in planning concepts. As it stands it appears to be a rather elementary form of linear programming exercise applied particularly to costs. It has however great potentiality because of its explicit acceptance of the principle of cost minimisation as a necessary part of any central goal of planning procedure. Once the design team is prepared to allow an explicit quantifiable rationale to dominate its decision the road to full acceptance of economic logic lies open. The present study is a kind of half-way house.

9.16. Some may feel that our insistence on economy will inevitably result in the production of dull, ugly and unimaginative settlements not much better than those which blighted the nineteenth century. We, however, think that such criticisms are ill-founded. It is not our purpose to insist that the cheapest and shoddiest piece of design shall win acceptance. Indeed we feel strongly that society can and should pay for good environment. Our feeling is, however, that costs of planned developments have in the past sometimes been raised not so much for the sake of good design as through wasteful siting and premature installation. It would be desirable to allocate to each project a certain sum for purely aesthetic considerations, and to allow the designer freedom to spend this sum as he chooses, in the knowledge that non-aesthetic decisions have been made in an optimal fashion.

Table S. I

Population in the Central Borders Counties 1951-1966

	Peebles	Roxburgh	Selkirk	Total
1901	15,066	48,804	23,356	87,226
1911	15,258	47,192	24,601	87,051
1921	15,352 ^a	44,989	22,607	82,948
1931	15,261	45,788	22,608	83,657
1951	15,252 ^b	45,557	21,729	82,538
1961	14,156	43,183	21,052	78,391
1966	14,170	43,480	21,740	79,400

Sources: For 1901 to 1961, General Register Office, Edinburgh, *Census of Scotland 1967, County Report Vol. 1, H.M.S.O., 1969.*

For Peebles, Part 25, page 19.

For Roxburgh, Part 26, page 19.

For Selkirk, Part 26, page 19.

For 1966, General Register Office, Edinburgh, *Sample Census 1966, Scottish County Report, Borders, Peebles, Roxburgh and Selkirk, H.M.S.O., 1966, page 1.*

a. The census for the year 1921 was taken in June (instead of the normal usual month of April). The figures were therefore inflated to a certain extent by the presence of holiday-makers from outside the area.

b. Includes 279 persons from other areas, attending the Breconshire Residential School, West Linton.

c. June 1946. A 50 per cent sample census.

Table S. II

Central Borders Population 1966

Peebles County	14,170
Roxburgh County	43,480
Selkirk County	21,740
	<hr/> 79,400
Plus: Longholm District	4,380
Less: Kelso District	8,380
	<hr/> 75,400

Sources: For Peebles, Roxburgh, Selkirk, Kelso: General Register Office, Edinburgh, *Sample Census 1966, Scottish County Report, Borders, Peebles, Roxburgh and Selkirk, H.M.S.O., 1966, page 1.*

For Longholm: General Register Office, Edinburgh, *Sample Census 1966, Scottish County Report, Longholm, Kelso and Alnham, H.M.S.O., page 1.*

Table S. III

Birth and Death rates per 1,000 population.

Central Borders Counties, and Scotland 1961-66

	Peebles		Roxburgh		Selkirk		Scotland	
	Births	Deaths	Births	Deaths	Births	Deaths	Births	Deaths
1961	15.4	17.1	15.4	15.9	15.5	15.7	19.5	12.3
1962	14.9	14.8	17.1	15.0	14.5	14.8	20.1	12.2
1963	17.1	15.0	15.1	14.4	14.6	14.4	19.7	12.6
1964	15.8	16.2	16.6	15.0	15.8	14.7	20.0	11.7
1965	17.5	16.2	15.2	14.2	16.9	15.1	19.5	12.1
1966	14.8	14.9	15.2	13.6	16.1	17.3	18.6	12.5

Sources: *Quarterly Returns of the Registrar-General for Scotland: Births, Deaths and Marriages 1961-66.*

Table S. IV

Age distribution of population

Scotland and Central Borders Counties, 1951, 1961, 1966

			Under 15		15-64	15-64	45-59	65 and over	
			Male	Female	Male	Female	Male	Female	Female
Scotland	1951	24.3	23.1	64.8	63.1	19.0	8.8	15.7	
	1961	27.6	24.2	63.8	37.1	20.8	8.6	17.8	
Peebles	1951	25.0	29.5	63.3	36.3	19.8	11.7	21.4	
	1961	26.4	21.2	61.0	32.0	21.6	12.6	25.2	
	1966	25.2	20.8	60.9	30.2	20.9	13.9	28.1	
Roxburgh	1951	34.0	39.5	64.7	39.1	20.2	11.0	21.2	
	1961	26.9	20.8	63.4	34.3	21.0	11.0	22.6	
	1966	23.7	21.4	66.1	35.4	19.1	10.2	24.0	
Selkirk	1951	22.1	17.6	65.9	39.1	21.5	12.0	21.8	
	1961	24.6	19.7	65.3	34.1	22.1	11.9	24.1	
	1966	27.1	20.3	61.4	37.3	17.4	11.3	26.7	
Central Borders	1951	25.7	19.2	64.6	39.0	20.4	11.6	21.3	
	1961	25.2	20.1	65.3	34.1	21.2	11.3	24.0	
	1966	24.9	21.1	64.9	34.9	18.9	11.2	24.9	

Sources:

For 1951, (56), General Register Office, Edinburgh, *Census of Scotland, (56) County Report, H.M.S.O., 1964.*

For Peebles, Vol. 1 Part 25, page 15.

For Roxburgh, Vol. 1 Part 26, page 26.

For Selkirk, Vol. 1 Part 26, page 26.

For Scotland, Vol. 3 page 67.

For 1966 General Register Office, Edinburgh, *Sample Census 1966, Scottish County Report, Borders, Peebles, Roxburgh and Selkirk, H.M.S.O., 1966, page 2.*

a. The percentages are somewhat different from those supplied by the Registrar-General for Scotland, given in Table S. X.

Table S. V
Projected death rates Central Borders 1966-86

			per annum per 1000	
Males	1966-71	1971-76	1976-81	1981-86
Age				
0-4	4.75	4.26	3.62	3.42
5-9	0.54	0.49	0.44	0.39
10-14	0.20	0.18	0.16	0.15
15-19	0.82	0.74	0.66	0.59
20-24	1.23	1.20	0.99	0.89
25-29	0.87	0.79	0.71	0.65
30-34	1.10	1.00	0.91	0.83
35-39	1.60	1.48	1.34	1.23
40-44	2.59	2.41	2.29	2.09
45-49	5.06	4.77	4.49	4.23
50-54	9.77	8.87	8.40	7.96
55-59	16.94	16.19	15.46	14.77
60-64	27.05	25.99	24.97	23.99
65-69	44.00	42.66	41.26	39.95
70-74	60.57	59.00	57.48	55.99
75-79	101.73	99.78	97.88	96.01
80-84	164.81	162.77	160.76	158.77
85+	257.23	255.68	254.15	252.63
Females				
0-4	3.89	3.41	3.06	2.75
5-9	0.42	0.38	0.34	0.31
10-14	0.22	0.19	0.18	0.16
15-19	0.19	0.17	0.15	0.14
20-24	0.31	0.28	0.25	0.22
25-29	0.46	0.42	0.37	0.34
30-34	0.72	0.64	0.58	0.52
35-39	1.17	1.06	0.96	0.87
40-44	1.99	1.81	1.63	1.50
45-49	3.59	3.29	3.03	2.80
50-54	5.48	5.10	4.76	4.44
55-59	8.46	8.00	7.50	7.07
60-64	13.68	13.00	12.36	11.75
65-69	25.70	24.69	23.72	22.79
70-74	42.87	41.02	39.12	38.06
75-79	76.79	75.00	73.16	71.35
80-84	127.66	125.75	123.82	121.95
85+	229.39	228.02	226.65	225.29

Source: Registrar General for Scotland.

Table S. VI
Projected age specific fertility rates for the Central Borders

			per annum per 1000	
Females	1966-71	1971-76	1976-81	1981-86
Age				
15-19	30.9	31.5	30.7	30.6
20-24	164.7	167.6	163.6	162.6
25-29	172.0	175.9	171.7	170.6
30-34	103.9	105.7	103.1	102.5
35-39	51.1	51.9	50.7	50.4
40-44	14.4	14.6	14.5	14.2
45-49	0.8	0.8	0.8	0.8

Source: Registrar General for Scotland.

Table S. VII
Migration population by Percentage Age Distribution

<i>Males</i>	<i>Glasgow Overpill</i>	<i>Scottish Emigration</i>
0-4	21	9
5-9	12	6
10-14	6	6
15-19	3	7
20-24	5	12
25-29	13	15
30-34	12	16
35-39	9	11
40-44	6	8
45-49	4	5
50-54	3	2
55-59	2	1
60-64	2	1
65-69	1	—
70-74	1	—
75-79	1	—
All Ages	100	100
<i>Females</i>		
0-4	18	10
5-9	11	7
10-14	6	8
15-19	3	7
20-24	9	13
25-29	14	15
30-34	11	13
35-39	8	10
40-44	5	6
45-49	4	4
50-54	3	3
55-59	2	2
60-64	2	1
65-69	2	—
70-74	1	—
75-79	1	—
All Ages	100	100

Source: Registrar General for Scotland.
a. Emigrants to England and Wales and overseas.

Table S. VIII
Central Borders Population Projections 1966-86

<i>Projection I</i>	<i>Births</i>	<i>Deaths</i>	<i>Natural Increase</i>	<i>Net Migration</i>	<i>Net increase or decrease</i>	<i>Thousands</i> <i>Total population at end of period</i>
1966						77.2
1966-71	5.1	5.7	+0.4	-2.5	-2.1	75.1
1971-76	5.3	5.5	+0.8	-2.5	-1.7	73.4
1976-81	5.1	5.4	+0.7	-2.5	-1.8	71.7
1981-86	5.0	5.3	+0.7	-2.5	-1.8	69.9
<i>Projection II</i>						
1966						77.2
1966-71	5.1	5.7	+0.4	-2.5	-2.1	75.1
1971-76	7.1	5.5	+1.6	+10.0	+11.6	86.7
1976-81	8.3	5.6	+2.6	+10.0	+12.6	99.4
1981-86	8.6	5.9	+2.7	-2.5	+0.2	99.6

Source: Registrar General for Scotland.

Table S. IX
Projections by Age and Sex, Central Borders Population
Mid 1955 to mid 1965

Thousands

Ages	Projection I					Projection II			
	1966	1971	1976	1981	1986	1971	1976	1981	1986
Males									
0-4	3.0	3.0	3.1	3.0	2.9	3.0	4.6	5.1	4.3
5-9	2.9	2.9	2.9	3.0	2.9	2.9	5.6	5.1	5.0
10-14	2.6	2.6	2.6	2.8	2.9	2.8	3.6	4.0	3.0
15-19	3.3	3.3	2.7	2.7	2.7	2.5	3.0	3.6	3.9
20-24	2.5	2.5	2.4	2.6	2.5	3.1	2.6	3.1	3.4
25-29	2.2	2.3	2.9	2.2	2.4	3.3	3.4	2.9	2.9
30-34	2.0	2.0	2.1	2.7	2.0	2.0	2.9	4.0	2.7
35-39	2.1	1.8	1.9	2.0	2.6	1.8	2.6	3.5	3.0
40-44	2.4	2.0	1.7	1.8	1.9	2.0	2.2	2.9	3.4
45-49	2.3	2.3	1.9	1.7	1.7	2.3	2.2	2.5	2.8
50-54	2.4	2.2	2.2	1.8	1.6	2.2	2.4	2.4	2.4
55-59	2.5	2.2	2.0	2.1	1.7	2.2	2.1	2.4	2.2
60-64	2.2	2.2	2.0	1.8	1.9	2.2	2.1	2.0	2.2
65+	4.2	4.5	4.8	4.8	4.6	4.5	5.0	5.2	5.1
All Ages	36.6	35.9a	35.4	34.9a	34.2a	35.9	42.1	40.0a	49.2
Females									
0-4	2.8	2.8	2.9	2.8	2.8	2.8	4.2	4.8	4.0
5-9	2.8	2.7	2.7	2.8	2.7	2.7	3.2	4.7	4.7
10-14	2.5	2.7	2.6	2.6	2.7	3.7	3.2	3.7	4.6
15-19	3.0	2.5	2.6	2.6	2.5	2.5	2.9	3.4	3.6
20-24	2.3	2.6	2.3	2.4	2.4	2.8	2.7	3.1	3.2
25-29	2.1	2.1	2.6	2.1	3.2	3.1	3.4	3.2	2.9
30-34	2.1	2.0	1.9	2.5	1.9	2.0	2.7	4.0	3.0
35-39	2.2	2.0	1.9	1.8	2.4	2.0	2.5	3.2	3.9
40-44	2.5	2.1	1.9	1.8	1.7	2.1	2.3	2.8	3.1
45-49	2.4	2.4	2.0	1.8	1.7	2.4	2.3	2.5	2.7
50-54	2.8	2.3	2.3	1.9	1.7	2.3	2.5	2.4	2.4
55-59	2.8	2.7	2.2	2.2	1.8	2.7	2.3	2.6	2.5
60-64	2.8	2.6	2.5	2.0	2.1	2.6	2.6	2.3	2.4
65+	7.5	7.6	7.6	7.4	6.9	7.6	7.9	8.1	7.7
All ages	40.6	39.2a	38.0	36.8a	35.6a	39.2a	44.6a	50.6a	50.4a

Source: Registrar General for Scotland, unpublished data.

a. The figures do not add up to the column totals owing to rounding.

Table S. X
Projections by Age and Sex—Central Borders population 1966-86

per cent

	Projection I					Projection II			
	1966	1971	1976	1981	1986	1971	1976	1981	1986
Males									
0-14	25.2	24.3	24.9	25.1	25.4	24.3	27.6	29.2	29.1
15-29	21.9	22.1	22.6	21.4	22.2	22.1	21.4	19.7	20.7
30-44	17.8	16.2	16.1	18.6	19.0	16.2	18.3	22.4	20.3
45-64	25.7	24.9	22.9	21.1	20.1	24.9	20.9	19.1	19.5
65+	11.5	12.6	13.6	13.7	13.4	12.6	11.9	10.7	10.4
	100.1	100.1	100.1	99.9	100.1	100.1	100.1	100.1	100.0
Females									
0-14	26.0	20.9	21.6	22.4	23.1	20.9	23.9	26.0	25.3
15-29	18.3	18.8	19.7	19.1	20.0	18.8	20.1	19.1	19.2
30-44	16.7	15.5	15.0	16.7	16.9	15.5	16.7	19.7	19.8
45-59	19.7	18.8	17.1	16.1	14.6	18.8	15.8	14.8	14.7
60+	25.4	26.0	26.6	25.7	25.4	26.0	23.4	20.5	20.0
	100.0	100.0	100.0	100.0	100.0	100.0	99.9	100.1	100.0

Source: Table IX.

Table S. XI
Numbers Unemployed in the Central Borders and % of Unemployed of Total, Male and Female Labour Force 1959-65

	1959		1960		1961		1962		1963		1964		1965		1966	
	Non.	%	Non.	%	Non.	%	Non.	%	Non.	%	Non.	%	Non.	%	Non.	%
Total	323	0.96	305	0.86	287	0.81	315	0.89	332	0.94	289	0.77	359	0.73	251	0.70
Males	358	1.3	239	1.3	228	1.0	249	1.2	271	2.4	218	1.1	236	1.0	260	0.76
Females	65	0.49	46	0.51	59	0.41	66	0.46	61	0.43	51	0.35	43	0.29	50	0.54

Source: Ministry of Labour.

Notes: Figures refers to the average for June each year.

Table S. XII
Total Percentage Unemployment in Various Regions and the Central Borders
1959-1966

Year	Central Borders	U.K.	South-East and East Anglia	South West	West and East Midlands, Yorkshire and Humberside	North West	North	Wales	Scotland	Northern Ireland
1959	0.96	2.3	1.3	2.1	1.6	2.8	3.3	3.8	4.4	7.8
1960	0.86	1.7	1.0	1.7	1.0	1.9	2.9	2.7	3.5	6.7
1961	0.81	1.6	1.0	1.4	1.1	1.6	2.5	2.6	3.1	7.5
1962	0.89	2.1	1.3	1.7	1.6	2.5	3.7	3.1	3.8	7.5
1963	0.94	2.6	1.6	2.1	2.0	3.1	5.0	3.6	4.8	7.9
1964	0.77	1.7	1.0	1.5	1.0	2.1	3.3	2.6	3.6	6.6
1965	0.73	1.5	1.1	1.6	0.9	1.6	2.6	2.6	3.0	6.1
1966	0.71	1.1	0.8	1.2	0.7	1.2	2.0	2.2	2.4	7.4
1959-66	0.81	1.8	1.2	1.7	1.2	2.1	3.2	2.9	3.5	7.2

Source: Ministry of Labour.

Note: Figures relate to the average for each year.

Table S. XIII
Employment in Central Borders by Industry and Sector

Industry	1959	1960	1961	1962	1963	1964	1965	1966
Agriculture	4,896	5,153	5,221	5,121	4,868	4,675	4,606	4,544
Engineering and Electrical	365	397	434	434	623	804	764	1,022
Textiles	11,996	13,256	13,124	12,677	12,789	13,103	13,320	13,142
a. Hosiery	5,306	5,327	5,780	5,482	5,705	5,581	5,144	5,880
b. Woollens	6,690	7,729	7,423	7,195	7,084	7,522	7,076	5,262
Other Manufacturing	1,375	1,450	1,397	1,517	1,430	1,306	1,368	1,265
Construction	2,144	2,014	2,033	2,200	2,468	2,344	2,543	2,357
Gas, Electricity and Water	473	435	442	418	412	430	267	411
Transport and Communications	1,262	1,308	1,300	1,368	1,340	1,092	1,038	1,040
Distributive Trades	3,570	3,609	3,571	3,671	3,560	3,537	3,570	3,741
Insurance, Banking, etc.	364	409	434	434	454	421	476	484
Professional and Scientific	2,401	2,366	2,751	2,719	2,845	2,551	2,680	3,058
Miscellaneous	3,451	3,485	3,317	3,412	3,441	3,385	3,755	3,512
Public Administration	1,254	1,206	1,258	1,225	1,329	1,189	1,174	1,306
TOTAL	33,783	35,235	35,352	35,364	35,442	34,818	35,401	35,776
Primary Sector	4,896	5,153	5,221	5,121	4,868	4,675	4,606	4,544
Secondary Sector	13,737	15,111	15,055	14,816	14,842	15,213	15,292	15,429
Tertiary Sector	15,150	14,971	15,076	15,387	15,712	14,930	15,503	15,803

Source: Ministry of Labour.

Note: (1) For interpretation of 'other manufacturing' see text page 12.

(2) Figures relate to 1 week in June each year.

Table S. XIV
Industrial Structure 1966
Percentage of Total Employment by Industry

	Employment as percentage of total labour force		Employment as percentage of labour force in sector		Percentage of male employees in industry	
	Central Borders	National	Central Borders	National	Central Borders	National
Agriculture	13.0	2.1	—	68.0	87.6	81.5
Engineering and Electrical	2.2	9.7	5.0	25.0	88.5	72.0
Textiles	37.3	3.3	86.4	9.0	46.2	47.0
a. Hosiery	17.3	0.8	40.2	1.4	19.2	38.0
b. Woollens	20.0	0.8	46.2	3.0	32.3	47.4
Other Manufacturing	3.7	24.4	4.6	62.6	78.8	—
Construction	7.2	7.1	23.0	12.0	94.1	95.0
Gas, Electricity and Water	0.7	1.7	1.7	3.4	91.1	88.0
Transport	2.9	7.0	6.7	12.0	88.7	83.0
Distributive Trades	10.1	13.0	23.0	22.0	52.4	47.0
Insurance, Banking, etc.	1.0	2.7	3.4	—	43.9	—
Professional and Scientific	7.6	10.0	17.3	—	32.0	—
Financial, Professional and Scientific	7.9	13.0	18.0	25.4	36.9	38.0
Miscellaneous	10.6	9.5	24.2	16.0	76.4	37.0
Public Administration	3.3	5.6	7.4	3.6	40.4	71.0
Primary Sector	13.0	4.9	—	—	87.6	90.4
Secondary Sector	43.2	38.2	—	—	59.7	68.2
Tertiary Sector	43.8	56.9	—	—	57.7	58.3
All Sectors	100.0	100.0	—	—	58.6	63.6

Source: 1. Ministry of Labour. 2. Monthly Digest of Statistics, HMSO, July 1967.

Note: (1) Figures relate to June 1966.

(2) For difference in definition of textile industry at regional and national level see text.

(3) Financial, Professional and Scientific derived by combining 'Insurance, Banking and Finance' with 'Professional and Scientific'. This is done to be in line with the national figures which are only given in one category.

Table S. XV
Growth Rates of Employment in the Central Borders

Industry	59-65	66-61	61-62	62-63	63-64	64-65	59-65	65-66	59-66
Agriculture	5.3	1.3	-1.9	-4.9	-4.0	-1.5	-5.9	-9.1	-7.2
Engineering and Electrical	8.2	34.5	36.2	3.0	29.0	-3.0	10.7	33.8	179.2
Textiles	10.8	-1.0	-3.4	0.8	2.4	0.9	10.2	-0.6	9.6
a. Hosiery	4.2	3.2	-3.9	4.1	4.6	2.7	15.8	12.0	29.7
b. Woollen	15.3	-4.0	-3.1	-1.5	0.5	-0.7	5.8	-11.5	-6.4
Other Manufacturing	6.0	-4.2	3.4	-3.7	-8.7	0	-4.9	-3.3	-8.0
Construction	-6.1	0.9	8.8	12.2	-5.1	8.5	18.6	-7.3	10.0
Gas, Electricity and Water	-8.1	1.6	-3.4	0	4.4	-37.9	-66.6	31.9	-13.1
Transport	-4.1	-0.7	-2.5	-2.3	-11.9	-3.0	-23.9	-	-23.7
Distributive Trades	0.9	-0.9	2.8	-4.6	0.9	0.9	0	4.8	4.8
Insurance, Banking and Finance	12.4	6.1	9.2	4.2	-2.7	-1.0	30.8	1.7	33.0
Professional and Scientific	2.9	10.0	-1.2	4.6	-10.3	5.1	10.2	14.1	25.8
Financial, Professional and Scientific	4.1	9.5	0.2	4.6	-9.2	4.1	-3.5	12.2	26.7
Miscellaneous	1.0	-4.2	2.9	0.8	-1.6	10.9	8.4	-6.3	1.8
Public Administration	-10.2	1.0	0	8.5	-16.3	5.8	-13.3	2.2	-11.4
TOTAL	4.3	0.3	-0.3	0.3	-1.8	1.7	4.8	1.1	3.9
Primary Sector	5.2	1.3	-1.9	-4.9	0	-1.5	-5.9	-9.1	-7.2
Secondary Sector	10.0	-0.4	-1.5	0	2.5	0.5	11.8	0.9	12.3
Tertiary Sector	-1.2	0.7	2.1	2.2	-5.1	3.8	2.3	1.9	4.3

Source: Ministry of Labour.

Notes: (1) For interpretation of 'Other Manufacturing', 'Textiles' and 'Financial, Professional and Scientific' see notes to Table S. XIV.

(2) Figures based on those given in Table S. XII.

Table S. XVI
Annual Percentage Change in Employment 1955-66

Industry	Central Borders 59-66 Compound	National 59-66 Compound
Agriculture	-1.1	-4.6
Engineering and Electrical	14.9	2.7
Textiles	1.1	1.4
Hosiery	3.7	0.9
Woollen	-0.9	-1.8
Other Manufacturing	-1.1	2.8
Construction	1.2	2.8
Gas, Electricity and Water	-2.1	1.8
Transport	-3.8	-0.6
Distributive Trades	0.7	1.4
Finance	4.1	3.7
Professional and Scientific	3.3	3.2
Financial, Professional and Scientific	3.4	3.6
Miscellaneous	0.3	2.0
Public Administration	-1.7	1.4
TOTAL	0.8	1.4
Primary Sector	-1.1	-4.6
Secondary Sector	1.7	0.0
Tertiary Sector	0.6	2.2

Source: Ministry of Labour and Monthly Digest of Statistics.

Notes: For definition of 'Textiles', 'Other Manufacturing' and 'Financial, Professional and Scientific' see notes to Table S. XIV.

Table S. XVII
Growth Rates of Industries in the United Kingdom and the Central Borders

	Annual Growth Rates		Employment as percentage of total Labour Force	
	National 1955-66	C. Borders 1955-66	National	C. Borders
Growth Industries				
Professional and Scientific	3.2	3.3	10.0	7.6
Insurance, Banking and Finance	3.7	4.1	3.7	1.3
Construction	2.8	1.2	7.1	7.2
Other Manufacturing	2.8	-1.1	26.0	9.7
Engineering and Electrical	2.7	14.9	9.7	2.2
Distributive Trades	1.4	0.7	13.0	10.1
Average Industries or Irregular Growers				
Gas, Electricity and Water	1.8	-2.1	1.7	0.7
Miscellaneous Services	2.0	0.3	9.5	10.6
Below Average Industries				
Public Administration	1.4	1.7	5.6	3.3
Transport and Communication	-0.6	3.8	7.0	2.9
Textiles	-1.4	1.1	3.3	37.3
Agriculture, Forestry and Fishing	-4.6	-1.1	2.1	13.0

Source: Ministry of Labour and Monthly Digest of Statistics.

Notes: 'Professional and Scientific' and 'Insurance, Banking and Finance', stable in the period 1955-66.

Table S. XVIII

1960 Employment by Industry—Low Textile Projection

Industry	Existing Industries		Induced Expansion of Service Sector		Remaining Labour according to survey 'Mix'		Final Industrial Structure	
	% Change p.a.	Total	% allocation	Total	% of 'Mix'	Total	%	Total
Agriculture	-4.0	2,553	—	—	—	—	6.0	2,553
Food, Drink and Tobacco	—	—	—	—	6.5	268	0.6	268
Chemicals and Allied Industries	—	—	—	—	4.2	173	0.4	173
Metal Manufacture	—	—	—	—	5.4	222	0.5	222
Engineering and Electrical	1.9	1,337	—	—	52.3	2,153	8.3	3,490
Vehicles	—	—	—	—	3.2	132	0.3	132
Metal Manufacture not elsewhere specified	—	—	—	—	8.9	366	0.9	366
Textiles	-1.0	11,635	—	—	—	—	27.7	11,635
a. Hosiery	0.0	6,894	—	—	—	—	16.4	6,894
b. Woollen	-2.0	4,741	—	—	—	—	11.3	4,741
Clothing and Footwear	—	—	—	—	5.2	214	0.5	214
Bricks, Pottery, Glass	—	—	—	—	0.3	12	—	12
Timber Furniture	—	—	—	—	1.7	70	0.2	70
Paper, Printing and Publishing	—	—	—	—	4.4	182	0.4	182
Other Manufacture	0.0	1,308	—	—	7.9	325	3.9	1,638
Construction	3.1	3,615	—	—	—	—	8.6	3,615
Gas, Electricity and Water	-2.1	307	1.0	69	—	—	0.0	376
Transport	-4.2	571	2.5	172	—	—	1.8	743
Distributive Trades	0.4	3,570	11.0	758	—	—	10.3	4,328
Insurance, Banking	3.3	762	2.2	152	—	—	2.2	914
Professional and Scientific	1.3	3,685	10.0	689	—	—	10.4	4,347
Miscellaneous	2.0	4,656	10.0	689	—	—	12.7	5,345
Public Administration	-0.2	1,174	3.5	241	—	—	3.4	1,415
TOTAL		35,173		2,770	100.0	4,117	100.0	42,060

Table S. XIX

1960 Employment by Industry—High Textile Projection

Industry	Existing Industries		Induced Expansion of Service Sector		Remaining Labour according to Survey 'Mix'		Final Industrial Structure	
	% Change p.a.	Total	% allocation	Total	% of 'Mix'	Total	%	Total
Agriculture	-4.0	2,553	—	—	—	—	6.1	2,553
Food, Drink and Tobacco	—	—	—	—	6.5	268	0.5	226
Chemicals and Allied Industries	—	—	—	—	4.2	146	0.3	146
Metal Manufacture	—	—	—	—	5.4	187	0.4	187
Engineering and Electrical	1.9	1,337	—	—	52.3	1,815	7.5	3,152
Vehicles	—	—	—	—	3.2	111	0.3	111
Metal Manufacture not elsewhere specified	—	—	—	—	8.9	309	0.8	309
Textiles	-0.2	12,720	—	—	—	—	30.2	12,720
a. Hosiery	0.0	6,894	—	—	—	—	16.4	6,894
b. Woollen	-0.5	5,826	—	—	—	—	13.8	5,826
Clothing and Footwear	—	—	—	—	5.2	180	0.4	180
Bricks, Pottery, Glass	—	—	—	—	0.3	10	—	10
Timber Furniture	—	—	—	—	1.7	59	0.2	59
Paper, Printing and Publishing	—	—	—	—	4.4	153	0.4	153
Other Manufacture	0.0	1,308	—	—	7.9	274	3.8	1,582
Construction	3.1	3,615	—	—	—	—	8.6	3,615
Gas, Electricity and Water	-2.1	307	1.0	58	—	—	0.9	365
Transport	-4.2	571	2.5	145	—	—	1.7	716
Distributive Trades	0.4	3,570	11.0	638	—	—	10.0	4,208
Insurance, Banking	3.3	762	2.2	128	—	—	2.1	890
Professional and Scientific	1.3	3,685	10.0	580	—	—	10.1	4,265
Miscellaneous	2.0	4,656	—	580	—	—	12.4	5,236
Public Administration	-0.2	1,174	3.5	203	—	—	3.3	1,377
TOTAL		36,258		2,332	100.0	3,470	100.0	42,060

Table S. XX
1980 Male/Female Employment Distribution (Low) Textile Projection

Industry	Existing Industries		Induced Expansion of Service Sector		Remaining Labour According to Survey 'Mis'		Final Industrial Structure		Percentage	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Agriculture	2,231	322	—	—	—	—	2,231	322	87.4	12.6
Food, Drink, Tobacco	—	—	—	—	115	153	115	153	42.9	57.1
Chemicals and Allied Industries	—	—	—	—	101	72	101	72	58.4	41.6
Metal Manufacture	—	—	—	—	196	26	196	26	88.3	11.7
Engineering and Electrical	1,076	261	—	—	1,533	620	2,659	881	74.8	25.2
Vehicles	—	—	—	—	97	35	97	35	73.5	26.5
Metal Manufacture not elsewhere specified	—	—	—	—	315	51	366	51	86.1	13.9
Textiles	4,351	6,284	—	—	—	—	4,351	6,284	46.0	54.0
a. Hosiery	2,877	4,017	—	—	—	—	2,877	4,017	41.7	58.3
b. Woollens	2,474	2,267	—	—	—	—	2,474	2,267	72.2	27.8
Clothing and Footwear	—	—	—	—	30	184	30	184	14.0	86.0
Leather, Textiles, Glass	—	—	—	—	8	4	8	4	66.7	33.3
Timber, Furniture	—	—	—	—	58	12	58	12	83.9	17.1
Paper, Printing, Publishing	—	—	—	—	113	69	182	69	62.1	37.9
Other Manufacture	1,031	277	—	—	201	134	305	134	75.8	24.2
Construction	3,409	206	—	—	—	—	3,409	206	94.3	5.7
Gas, Electricity, Water	281	26	63	69	—	—	344	52	91.5	8.5
Transport	461	130	139	35	—	—	600	143	743	80.8
Distributive Trades	1,871	1,699	361	736	—	—	2,268	2,060	4,378	19.2
Insurance, Banking	487	275	97	55	—	—	584	330	53.4	47.6
Professional, Scientific	1,179	2,106	220	469	—	—	1,399	2,975	4,374	36.1
Miscellaneous	3,566	1,090	528	161	—	—	4,094	1,251	5,345	68.0
Public Administration	477	697	98	143	241	—	575	840	76.6	23.4
	21,420	11,753	1,542	1,228	2,770	1,350	25,729	16,331	42,060	59.4
									61.2	38.8

Table 8. XXI
1980 Male/Female Employment Distribution (High) Textile Projection

Industry	Existing Industries		Induced Expansion of Service Sector		Remaining Labour According to Survey 'Mix'		Final Industrial Structure		Male/Female Industry Percentage Distribution	
	Male	Female	Total	Male	Female	Total	Male	Female	Male	Female
Agriculture	2,231	322	2,553	—	—	—	2,231	322	87.4	12.6
Food, Drink, Tobacco	—	—	—	97	129	226	97	129	42.9	57.1
Chemicals and Allied Industries	—	—	—	85	61	146	85	61	58.2	41.8
Metal Manufacture	—	—	—	165	22	187	165	22	88.2	11.8
Engineering and Electrical	1,076	261	1,337	1,252	523	1,815	2,368	784	25.1	24.9
Vehicles	—	—	—	82	29	111	82	29	73.9	26.1
Metal Manufacture not elsewhere specified	—	—	—	266	43	309	266	43	86.1	13.9
Textiles	6,012	6,708	12,720	—	—	—	6,012	6,708	47.3	52.7
a. Hosiery	2,877	4,017	6,894	—	—	—	2,877	4,017	41.7	58.3
b. Woollens	3,135	2,691	5,826	—	—	—	3,135	2,691	53.8	46.2
Clothing and Footwear	—	—	—	25	155	180	25	155	13.9	86.1
Bricks, Pottery, Glass	—	—	—	7	3	10	7	3	70.0	30.0
Timber, Furniture	—	—	—	49	10	59	49	10	83.1	16.9
Paper, Printing, Publishing	1,031	277	1,308	—	—	—	1,031	277	62.1	37.9
Other Manufacture	3,489	266	3,755	170	104	274	3,409	206	94.3	5.7
Construction	—	—	—	—	—	—	—	—	91.5	8.5
Gas, Electricity, Water	—	—	—	53	—	—	53	—	80.7	19.3
Transport	281	26	307	117	28	145	205	2,003	32.4	47.6
Distributive Trades	451	110	571	334	304	638	334	321	63.9	36.1
Insurance, Banking	1,871	1,699	3,570	82	46	128	1,871	1,699	32.0	68.0
Professional, Scientific	487	275	762	—	—	—	487	275	76.6	23.4
Miscellaneous	1,179	2,506	3,685	186	394	580	1,365	2,900	40.6	59.4
Public Administration	3,566	1,090	4,656	444	136	580	4,010	1,226	76.6	23.4
	477	697	1,174	82	121	203	559	818	40.6	59.4
	22,081	14,177	36,258	1,298	1,034	2,332	25,712	16,348	61.1	38.9

Table S. XXII
Costs of Additional Population Increases

Town	Incremental Increase in Population	Total Population	Increment in Super-normal Costs			Total Increment in Cost		Total Cost
			Physical	Cost of Sewerage	Cost of Water	Total	Per capita	
1	2	3	4	5	6	7	8	9
Galashiels	1,627 3,000 6,975	1,627 4,627 11,602	— 174,437 561,787	26,032 (pc) 48,000 (pc) 111,600 (pc)	32,540 (pc) 60,000 (pc) 139,500 (pc)	58,572 282,437 812,887	36-0 94-1 116-5	58,572 341,009 1,153,896
Hawick	194 56 194 3,356 3,094	194 250 444 3,800 6,894	— 1,456 5,044 67,134 204,341	— — — — 60,000	— — 650,000 — —	— 1,456 650,044 67,134 264,341	— 26-0 252-0 20-0 85-4	— 1,456 656,300 723,634 987,975
St. Boswells	2,375 1,125 1,500 6,125	2,375 3,500 5,000 11,125	59,875 18,000 24,000 38,000	85,000 — 150,000 2,500 (pc)	— — 20,000 98,000 (pc)	144,875 18,000 194,000 136,500	161-0 16-0 125-0 23-0	144,875 162,875 336,875 495,375
Selkirk	866 125	866 991	— 11,000	17,320 (pc) 2,500 (pc)	25,980 (pc) 3,750	43,300 17,250	50-0 138-0	43,300 60,550
Jedburgh	1,355 995 1,150	1,355 2,350 3,500	— 15,920 38,400	— — 40,000	— — —	15,920 58,400	16-0 5-1	15,920 74,320
Melrose	1,100	1,100	27,100	4,000	22,000	89,100	81-0	89,100
Clovenfords	1,125	1,125	64,625	22,500 (pc)	22,500 (pc)	109,625	97-4	109,625

Table S. XXIII
The Cost of the Various Development Models

Model	Town	Population Increase	Sites to be developed	Cost		Grand Total	
				Cost per capita	Total	Population	Cost
1	2	3	4	5	6	7	8
1	St. Boswells Galashiels	11,125 3,000 1,875	R.11, R.12, B.13, B.21, R.22 G.11, G.12, G.13, G.14 G.22	44-5 94-1 112-0	495,375 282,300 210,000	— — 16,000	— — 987,675
2	Hawick Galashiels	6,894 3,000 2,100 4,006	H.11, H.21, H.22 H.23, H.24, H.25 H.26, H.27, H.28 G.11, G.12, G.13, G.14 G.22 G.21 (part)	143-0 94-1 112-0 118-5	987,975 282,300 235,200 474,711	— — — 16,000	— — — 1,980,186
3	Jedburgh Hawick Galashiels	2,145 6,894 3,000 2,100 1,861	J.21 H.11, H.21, H.22, H.23 H.24, H.25, H.26, H.27, H.28 G.11, G.12, G.13, G.14 G.22 G.21 (part)	34-6 143-0 94-1 112-0 118-5	74,320 987,975 282,300 235,200 220,528	— — — — 16,000	— — — — 1,800,323
4	Galashiels Selkirk Clovenfords Melrose St. Boswells	9,975 125 1,125 1,100 3,500	G.11, G.12, G.13, G.14, G.21, G.22 S.11 C.21, C.22, C.23 M.11, M.12, M.13, M.14 B.11, B.12, B.13, B.22 (part)	150-0 138-0 97-4 81-0 40-3	1,494,905 17,250 108,625 89,100 141,000	— — — — 15,825	— — — — 1,851,880
5	Hawick St. Boswells Galashiels	5,500 5,000 3,000 2,100 400	H.23, H.27, H.24 H.11, H.25, H.26, H.28 H.22 R.22 G.11, G.12, G.13, G.14 G.22 G.21	162-4 50-0 94-1 112-0 118-5	893,350 250,000 282,300 235,200 47,400	— — — — 16,000	— — — — 1,708,250
6	Jedburgh St. Boswells Hawick Galashiels	2,145 5,000 3,750 3,000 2,100	J.21 R.22 H.11, H.23, H.27, H.24, H.25 G.11, G.12, G.13, G.14 G.22	34-6 30-0 194-4 94-1 112-0	74,320 250,000 729,250 282,300 235,200	— — — — 15,995	— — — — 1,571,070

Table S. XXIV
Population Distributions under the Various Models

Town	Existing Population 1965 (including committed development)	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Increase	Total	Increase	Total	Increase	Total	Increase	Total	Increase	Total	Increase	Total
Galashiels	14,000	4,875	18,875	9,106	23,106	6,961	20,961	9,975	23,975	5,500	19,500	5,100	19,100
St. Boswells	2,060	11,125	13,185	—	2,060	—	2,060	3,500	5,560	5,000	7,060	5,000	7,060
Hawick	16,400	—	16,400	6,894	23,294	6,894	23,294	—	16,400	5,500	21,900	3,750	20,150
Jedburgh	5,000	—	5,000	—	5,000	2,145	7,145	—	5,000	—	5,000	2,145	7,145
Melrose	2,642	—	2,642	—	2,642	—	2,642	1,100	3,742	—	2,642	—	2,642
Selkirk	6,500	—	6,500	—	6,500	—	6,500	125	6,625	—	6,500	—	6,500
Clevenfords	140	—	140	—	140	—	140	1,125	1,265	—	140	—	140

Table S. XXV
Travel Time between Centres

	Population 1 including committed development	Galashiels	Melrose	St. Boswells	Hawick	Jedburgh	Selkirk	Earlston	Peebles	Innerleithen	Dumack
Galashiels	14,000	1	—	—	—	—	—	—	—	—	—
Melrose	2,642	6	1	—	—	—	—	—	—	—	—
St. Boswells	2,060	10	4	—	—	—	—	—	—	—	—
Hawick	16,400	35	31	34	1	—	—	—	—	—	—
Jedburgh	5,000	27	21	17	30	1	—	—	—	—	—
Selkirk	6,500	13	13	20	27	36	1	—	—	—	—
Earlston	1,200	14	8	7	43	23	21	1	—	—	—
Peebles	6,348	38	44	49	65	74	34	50	1	—	—
Innerleithen and Walkreburn	3,227	24	30	35	35	51	24	36	14	1	—
Dumack	4,000	4	2	7	35	23	11	10	42	38	1

Table S. XXVI
Benefits for n = 1

	Population 1 including committed development	Gallowhills	Midrose	St Boswells	Hawick	Jedburgh	Selkirk	Earlston	Peebles	Inverlathen	Darnick
Gallowhills	14,000	14,000	2,333	1,400	400	519	1,272	1,000	368	583	3,500
Midrose	2,642	440	2,642	663	71	1,268	205	330	60	88	321
St Boswells	2,060	206	515	2,060	61	121	103	294	42	59	294
Hawick	16,400	669	443	16,400	16,400	547	687	311	252	469	419
Jedburgh	5,000	185	238	294	167	5,000	119	217	68	98	217
Selkirk	6,500	491	338	320	241	181	6,500	310	121	221	591
Earlston	1,200	168	140	171	28	52	57	1,200	24	33	120
Peebles	6,348	167	144	130	98	86	167	127	6,348	455	151
Inverlathen and Walkerburn	3,227	134	108	92	52	63	135	90	231	3,227	85
Darnick	4,000	1,000	2,400	571	144	174	364	400	95	165	4,000
Total Benefits		17,278	9,073	6,181	17,672	6,869	9,547	4,349	7,639	5,386	10,745

Table S. XXVII
Benefits for n = 2

	Population 1 including committed development	Gallowhills	Midrose	St Boswells	Hawick	Jedburgh	Selkirk	Earlston	Peebles	Inverlathen	Darnick
Gallowhills	14,000	14,000	389	140	11	19	116	71	10	24	875
Midrose	2,642	73	2,642	165	2	9	16	41	1	3	661
St Boswells	2,060	21	15	2,060	2	7	4	42	1	2	42
Hawick	16,400	13	13	14	16,400	18	22	9	14	13	13
Jedburgh	5,000	7	11	17	5	5,000	4	8	5	9	54
Selkirk	6,500	54	38	16	9	3	6,500	15	5	11	12
Earlston	1,200	6	19	24	1	1	1,200	3	6,348	1	3
Peebles	6,348	4	3	3	1	1	6	3	16	32	2
Inverlathen and Walkerburn	3,227	6	4	5	3	1	33	40	2	3,227	4,000
Darnick	4,000	250	1,000	82	4	8				3,318	5,671
Total		14,434	4,131	2,524	16,438	5,667	6,706	1,433	6,388	3,318	5,671

Table S. XXVIII
Calculation of Future Bus Demand

A. Edinburgh-Carlisle Route

	Population	Distance (miles)	
Edinburgh	472,000	8	
Dalkeith	9,000	25	
Galashiels and Melrose	14,000	6	
Selkirk	5,000	12	
Hawick	16,000	23	
Langholm	2,000	21	
Carlisle	7,000		

Total number of passengers 1965 = 924,897... (a)
(as stated by Scottish Omnibus Ltd)

Total number of passengers = (a)
Total weight = (b) = 0.0010735... (c)

Possible journeys	1 Weight = $\frac{P_1 P_2}{d^2}$	2 Estimated passengers 1965 col. 1 \times (c)	3 1965 Population	4 1980 Population	5 % increase in population product	6 1980 passengers col. 2 \times col. 5
Edinburgh-Dalkeith	66,375,000	712,535	481,000	481,000	—	712,535
Edinburgh-Galashiels	6,067,952	65,139	486,000	491,525	53.8	100,183
Edinburgh-Selkirk	1,531,611	16,657	477,000	478,625	32.5	22,070
Edinburgh-Hawick	2,505,498	31,169	488,000	489,900	11.9	34,878
Edinburgh-Langholm	172,388	1,850	474,000	474,000	—	1,850
Edinburgh-Carlisle	3,660,942	39,300	479,000	479,000	—	39,300
Dalkeith-Galashiels	201,600	2,164	23,000	28,525	53.8	3,328
Dalkeith-Selkirk	46,826	502	14,000	15,625	32.5	665
Dalkeith-Hawick	778,799	8,360	25,000	26,900	11.9	9,354
Dalkeith-Langholm	4,132	44	11,000	11,000	—	44
Dalkeith-Carlisle	84,234	904	16,000	16,000	—	904
Galashiels-Selkirk	1,944,444	20,873	19,000	26,150	203.0	63,245
Galashiels-Hawick	691,358	7,421	30,000	37,425	172.0	20,185
Galashiels-Langholm	16,656	178	16,000	21,525	53.8	273
Galashiels-Carlisle	25,494	273	21,000	26,525	53.8	419
Selkirk-Hawick	555,555	5,963	21,000	24,525	148.0	14,788
Selkirk-Langholm	8,163	87	7,000	8,625	32.5	115
Selkirk-Carlisle	111,607	1,198	12,000	13,625	32.5	1,587
Hawick-Langholm	50,491	649	18,000	19,900	11.9	726
Hawick-Carlisle	578,512	6,210	23,000	24,900	11.9	6,949
Langholm-Carlisle	317,460	3,408	9,000	9,000	—	3,408
	86,156,722 (b)					1,036,806 (d)

1958 1965 1975 (projected) 1980 (projected)
 Passenger journeys per head = 2.24 1.56... (b) 0.932... (f) 0.719... (g)

The figures for 1975 and 1980 were projected assuming the same compound rate of decrease as between 1958-65, namely 5.05% p.a.

- Upper limit of demand = (d) = 1,036,806
- Lower limit of demand in 1975 = (d) \times $\frac{(f)}{(b)}$ = 1,036,806 \times 0.5955 = 617,417
- Lower limit of demand in 1980 = (d) \times $\frac{(g)}{(b)}$ = 1,036,806 \times 0.4594 = 476,308

B. Galashiels-Berwick Route

	Population	Distance (miles)	
Galashiels and Melrose	14,000	9	
Earlston	2,000	11	
Greenlaw	700	7	
Duns	2,000	15	
Berwick	4,000		

Total number of passengers 1965 = 364,537... (h)
(as stated by Scottish omnibuses)

Total number of passengers = (h)
Total weight = (i) = 0.673... (j)

Possible journeys	1 Weight = $\frac{P_1 P_2}{d^2}$	2 Estimated passengers 1965 col. 1 \times (j)	3 1965 Population	4 1980 Population	5 % increase in population product	6 1980 passengers col. 2 \times col. 5
Galashiels-Earlston	345,679	232,641	16,000	21,525	53.8	357,802
Galashiels-Greenlaw	24,500	16,488	14,700	20,225	44.5	23,825
Galashiels-Duns	38,408	25,848	16,000	21,525	53.8	39,754
Galashiels-Berwick	31,746	21,365	18,000	23,525	60.0	35,893
Earlston-Greenlaw	11,570	7,786	27,000	27,000	—	7,786
Earlston-Duns	12,345	8,308	4,000	4,000	—	8,308
Earlston-Berwick	7,346	4,543	6,000	6,000	—	4,943
Greenlaw-Duns	28,537	19,228	2,700	2,700	—	19,228
Greenlaw-Berwick	5,785	3,893	4,700	4,700	—	3,893
Duns-Berwick	35,555	23,928	6,000	6,000	—	23,928
	541,505 (i)					525,360 (k)

1958 1965 1975 (projected) 1980 (projected)
 Passenger journeys per head = 14.16 11.79... (l) 9.068... (m) 7.95... (n)

The figures for 1975 and 1980 were projected assuming the same compound rate of decrease as between 1958-65, namely 2.82% p.a.

- Upper limit of demand = (k) = 525,360
- Lower limit of demand in 1975 = (k) \times $\frac{(m)}{(l)}$ = 525,360 \times 0.769 = 404,001
- Lower limit of demand in 1980 = (k) \times $\frac{(n)}{(l)}$ = 525,360 \times 0.6742 = 354,197

	Population	Distance (miles)
Galashiels and Melrose	14,000	8
St Boswells	1,000	10
Kelso	4,000	

Total number of passengers 1965 = 1,135,581... (p)
(as stated by Scottish Omnibuses)

$$\frac{\text{Total number of passengers}}{\text{Total weight}} = \frac{(p)}{(q)} = 2.6... (r)$$

Possible journeys	1 Weight = $\frac{P_1 P_2}{d^2}$	2 Estimated 1965 passengers col. 1 \times (r)	3 1965 population	4 1980 population	5 % increase in population product	6 1980 passengers col. 2 + col. 2 \times col. 5
Galashiels-St Boswells	218,750	563,750	15,000	24,437	1,463	11,735,312
Galashiels-Kelso	172,839	449,381	18,000	23,525	53.8	691,147
St Boswells-Kelso	40,000	104,000	5,000	15,000	1,118	1,296,720
	431,589 (q)					13,691,179 (q)
Passenger journeys per head = 59.04	1965	1975 (projected)	1980 (projected)			
		45.077*	39.82*			
		35.17†	27.12†			

*projected using the compound rate of decrease on the Galashiels-Berwick route.
†projected using the compound rate of decrease on the Edinburgh-Carlisle route.

1. Upper limit of demand = (q) = 13,691,179
2. Lower limit of demand 1975 (taking an average of the two projections) = 9,303,156
3. Lower limit of demand 1980 (taking an average of the two projections) = 7,760,844

Table S. XXIX
Scotland—Distribution of Population 1801–1961

	1801		1851		1911		1961	
	No.	%	No.	%	No.	%	No.	%
North	740,597	46.0	1,021,781	35.4	1,075,336	22.6	973,691	18.8
Crofting Counties	302,817	18.8	395,540	13.7	341,535	7.2	277,948	5.4
Remainder	437,780	27.2	626,241	21.7	733,801	15.4	695,743	13.4
East Central	351,937	21.9	467,621	16.1	1,255,930	26.4	1,465,714	28.3
West Central	331,110	20.6	426,221	15.1	2,169,754	45.6	2,492,677	48.1
South	184,776	11.5	273,119	9.4	259,884	5.4	247,262	4.8
Border Counties	78,050	4.9	108,486	3.7	116,694	2.4	100,628	2.0
Remainder	106,726	6.6	164,633	5.7	143,190	3.0	146,634	2.8
Scotland	1,608,420	100.0	2,888,742	100.0	4,760,904	100.0	5,179,344	100.0

Table S. XXX
Central Borders—Population—Burghs/Landward

	1951				1961				1966 Estimates			
	Burghs		Landward		Burghs		Landward		Burghs		Landward	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Roxburgh Co. (part)	22,946	62.5	13,776	37.5	21,984	62.7	13,060	37.3	22,125	63.7	12,584	36.3
Selkirk Co.	18,352	84.5	3,377	15.5	18,007	85.5	3,045	14.5	17,615	86.6	2,733	13.4
Peebles Co.	8,374	35.0	6,838	45.0	7,847	55.4	6,309	44.6	7,682	56.9	5,811	43.1
Dumfries Co. (part)	2,404	47.3	2,676	52.7	2,370	49.7	2,403	50.3	2,347	51.0	2,250	49.0
SURVEY AREA	32,076	66.1	26,687	33.9	30,268	66.9	24,817	33.1	40,769	68.0	23,378	32.0

Table 8. XXXI
Central Borders—Settlement Analysis 1961¹

	Peeblesshire			Roxburghshire ^a			Selkirkshire			Dumfriesshire ^a			Survey Area		
	No.	Population	% of total	No.	Population	% of total	No.	Population	% of total	No.	Population	% of total	No.	Population	% of total
Settlement	2	7,847	55.4	3	22,077 ^a	63.0	2	18,087	85.5	1	2,370	49.7	8	50,301	67.0
Small burghs	—	—	—	2	2,059	5.9	—	—	—	—	—	—	2	2,059	2.7
Towns	—	—	—	15	3,900	10.0	5	371	1.8	3	474	9.9	33	6,670	8.9
(population 1,000 or more)	10	2,325	16.4	28	763	2.2	14	385	1.8	12	280	5.8	82	2,063	2.8
Villages (population 50-1,000)	28	635	4.5	—	—	—	—	—	—	—	—	—	—	—	—
Hamlets	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(population less than 50)	—	—	—	39	791	2.2	15	432	2.0	5	93	2.0	82	1,935	2.6
Estates	23	629	4.4	85	1,667	4.8	12	218	1.0	—	—	—	134	2,253	3.1
Farms	26	65	0.5	1	15	—	—	—	—	—	—	—	—	—	—
Groups of smallholdings	1	335	2.4	1	19	—	—	—	—	—	—	—	—	—	—
Educational establishments	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hospitals	—	—	—	1	61	0.2	2	390	1.9	—	—	—	8	885	1.2
Religious communities	—	—	—	—	4,092	11.6	—	1,259	6.0	—	1,556	32.6	—	8,819	11.7
Scattered population	—	1,912	13.5	—	—	—	—	—	—	—	—	—	—	—	—
TOTAL	—	14,156	100.0	—	35,044	100.0	—	21,052	100.0	—	4,773	100.0	—	75,025	100.0

Based on 'Place Names and Population, Scotland' H.M.S.O. 1967.

That part of the county included in the Survey Area.

Including, in the case of Hawick, suburbs outwith burgh boundaries (93 population).

Table S. XXXII
Central Borders: Burghal Population Density 1961

Burgh	Population	Area	Persons per acre
Hawick	16,205	1,233	13.1
Jedburgh	3,647	533	6.8
Melrose	2,133	300	4.3
Galashiels	12,373	1,686	7.4
Selkirk	5,634	677	8.3
Innerleithen	2,299	414	5.6
Peebles	5,548	963	5.8
Langholm	2,370	257	9.2

Table S. XXXIII
Central Borders: Population—Age-Groups

	Under 15		15-44		45-64		Over 65		Total
	No.	%	No.	%	No.	%	No.	%	
Roxburgh Co. (part)	7,944	22.7	12,662	36.1	9,413	26.9	5,025	14.3	35,044
Selkirk Co.	4,620	21.9	7,466	35.4	5,827	27.8	3,139	14.9	21,052
Peebles Co.	3,339	23.6	4,731	33.4	3,850	27.2	2,236	15.8	14,156
Dumfries Co. (part)	1,078	22.6	1,781	37.3	1,278	26.8	636	13.3	4,773
Burghs	10,906	21.7	17,547	34.9	13,947	27.8	7,808	15.6	50,208
Landward	6,075	24.5	9,093	36.6	6,421	25.9	3,228	13.0	24,817
SURVEY AREA	16,981	22.6	26,640	35.5	20,368	27.2	11,036	14.7	75,025
Scotland		25.8		63.7				30.5	

Burgh	Percentage			
	Under 15	15-44	45-64	Over 65
Hawick	21.8	36.0	27.7	14.5
Jedburgh	24.9	36.7	25.8	12.6
Melrose	18.5	31.9	28.9	20.7
Galashiels	22.0	35.2	27.9	14.9
Selkirk	22.0	33.9	27.9	16.2
Peebles	19.9	32.2	29.5	18.4
Innerleithen	21.9	35.8	25.3	17.0
Langholm	21.1	34.4	27.6	16.9

Table S. XXXIV
Scotland: Fertility Rates 1961

Region	All ages under 45	Under 20	20-24	25-29	30-34	35-39	40-44	Mean family size	Proportion of infertile women
North	0.062	0.114	0.076	0.040	0.024	0.014	0.003	2.37	0.16
Crofting Counties	0.067	0.131	0.087	0.050	0.030	0.016	0.005	2.47	0.16
Remainder	0.061	0.110	0.073	0.036	0.021	0.012	0.002	2.33	0.16
East Central	0.067	0.119	0.078	0.038	0.023	0.014	0.004	2.27	0.17
West Central	0.076	0.128	0.089	0.047	0.029	0.016	0.004	2.43	0.16
South	0.064	0.127	0.078	0.036	0.024	0.013	0.001	2.22	0.17
Border Counties	0.055	0.114	0.070	0.032	0.022	0.009	—	2.07	0.18
Remainder	0.071	0.134	0.084	0.040	0.026	0.017	0.002	2.32	0.16

Table S. XXXV
Central Borders: Population—Intercensal changes 1901-1961

	1901-11		1911-21		1921-31		1931-51		1951-61	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Roxburgh Co. (part)	-1,278	3.3	-1,495	4.0	+ 900	2.5	- 26	0.1	-1,678	4.6
Selkirk Co.	+1,245	5.3	-1,994	8.1	+ 1	0.0	- 879	3.8	- 677	3.1
Peebles Co.	+ 192	1.3	+ 74	0.5	- 281	1.8	+ 181	1.2	-1,076	7.1
Dumfries Co. (part)	- 404	6.1	- 447	7.2	- 446	8.1	- 179	3.4	- 307	6.0
Burghs	+ 919	1.8	-2,991	5.6	+1,346	2.7	+ 478	0.9	-1,868	3.6
Landward	-1,164	5.7	- 871	2.9	-1,192	4.1	-1,381	4.9	-1,870	7.1
SURVEY AREA	- 245	0.3	-3,862	4.6	+ 154	0.2	- 903	1.1	-3,738	4.7

Table S. XXXVI
Central Borders: Population 1951-66

	Enumerated population				Estimated resident population			
	1951	1961	Change	% p.a.	1961	1966	Change	% p.a.
Roxburgh Co. (part)	36,722	35,044	-1,678	-0.40	35,239	34,709	-530	-0.30
Selkirk Co.	21,729	21,052	-677	-0.31	20,738	20,348	-390	-0.37
Peebles Co.	15,232	14,156	-1,076	-0.73	13,787	13,493	-294	-0.62
Dumfries Co. (part)	5,080	4,773	-307	-0.60	4,763	4,597	-166	-0.69
SURVEY AREA	78,763	75,025	-3,738	-0.47	74,527	73,147	-1,380	-0.37

Table S. XXXVII
Scotland: Population—Natural Increase and Migration

	1961 population	Change 1951-61		Natural increase		Estimated migration	
		Amount	%	Amount	%	Amount	%
North	973,691	-26,857	2.7	41,922	4.2	-68,779	6.9
Crofting Counties	277,948	-7,838	2.8	7,116	2.5	-14,954	5.3
Remainder	695,743	-19,019	2.7	34,806	4.9	-53,825	7.6
East Central	1,465,714	+49,967	3.5	89,507	6.3	-39,540	2.7
West Central	2,492,677	+68,148	2.8	196,532	8.1	-128,384	5.2
South	247,262	-8,329	3.3	8,815	3.4	-17,144	6.8
Border Counties	100,828	-6,758	6.4	486	0.4	-7,244	6.9
Remainder	146,434	-1,571	1.1	8,329	5.6	-9,900	6.7
SCOTLAND	5,179,344	+82,929	1.6	336,776	6.6	-253,847	4.9

Table S. XXXVIII
Central Borders: Population—Intercensal Change 1951-61

	Amount	Per cent per year		
		Total	By births and deaths	Balance
Roxburgh Co.	-2,374	-0.53	+0.11	-0.65
Hawick B.	-511	-0.31	+0.05	-0.36
Jedburgh B.	-438	-1.12	+0.40	-1.52
Melrose B.	-13	-0.06	-0.88	+0.82
Landward	-1,261	-0.70	+0.25	-0.95
Selkirk Co.	-677	-0.31	+0.03	-0.35
Galashiels B.	-123	-0.10	+0.04	-0.14
Selkirk B.	-222	-0.38	-0.09	-0.29
Landward	-332	-1.03	+0.22	-1.24
Peebles Co.	-1,076	-0.73	+0.08	-0.80
Inverleithen	-62	-0.26	0.00	-0.27
Peebles	-465	-0.80	-0.26	-0.54
Landward	-549	-0.83	+0.40	-1.23
Dumfries Co.				
Langholm B.	-34	-0.14	-0.40	+0.25

Table S. XXXIX
Central Borders: Population—Migration Movements 1960-61

From or To	Immigrants to				Emigrants from			
	Roxburgh Co.	Selkirk Co.	Peebles Co.	Total	Roxburgh Co.	Selkirk Co.	Peebles Co.	Total
Berwickshire	320	110	—	430	—	—	—	—
Peeblesshire	—	—	—	—	—	110	—	110
Roxburghshire	—	200	—	200	—	—	—	250
Selkirkshire	250	—	110	360	200	250	—	200
Lothian	—	—	110	110	—	—	100	100
Edinburgh	—	—	140	140	270	—	130	400
Glasgow	—	—	—	—	120	—	—	120
Elsewhere in Scotland	520	300	420	1,240	500	320	390	1,210
Elsewhere in British Isles	560	170	30	560	?	?	?	?
Abroad	170	10	30	210	?	?	?	?
TOTAL	1,620	790	840	3,250	1,090	680	620	2,390

Table S. XL.
Average Monthly and Annual Means of Daily Temperatures for the Period 1931-40

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	Max.												
	Min.												
	Mean												
Kelso	41.7 30.7 36.2	43.3 31.3 37.3	48.0 33.8 40.9	53.1 37.2 45.1	58.6 41.5 50.0	64.0 46.9 55.4	66.9 50.5 58.7	66.0 48.3 57.6	61.5 45.7 53.6	54.9 40.6 47.7	47.8 35.6 41.7	44.1 33.4 38.7	54.3 39.7 47.0
Sourhope	40.3 29.8 35.1	40.7 30.8 35.7	45.1 32.9 39.0	50.2 36.3 43.3	56.7 39.4 48.1	62.8 44.8 53.8	65.5 48.4 56.9	64.1 48.7 56.4	59.6 45.8 52.7	53.0 41.0 47.0	45.9 36.0 40.9	42.5 32.6 37.5	52.2 38.9 45.5
Hawick (Wanshope)	40.6 29.3 34.9	42.2 29.8 36.1	46.6 32.8 39.7	52.1 35.7 43.9	58.3 40.5 49.4	63.2 45.9 54.5	66.0 49.5 57.7	64.4 49.2 56.8	60.7 46.4 53.5	53.7 47.4 50.5	47.0 41.4 44.2	43.3 38.1 40.7	53.2 39.1 46.1
Selkirk (Browhill)	39.9 28.9 34.9	42.1 30.8 36.5	46.7 33.0 39.9	52.5 36.6 44.5	58.3 41.0 49.7	63.2 46.0 55.1	65.8 50.1 57.9	64.5 49.9 57.2	60.3 46.8 53.5	52.9 41.3 47.1	46.2 36.1 41.1	42.5 33.0 37.7	52.9 39.6 46.3
Broughton (Searhope)	39.8 28.5 34.7	41.4 30.6 36.0	46.1 33.0 39.5	51.1 35.1 43.1	57.5 39.3 48.5	62.5 45.0 53.7	64.9 48.9 56.9	63.8 48.2 56.0	59.6 45.1 52.3	52.6 40.8 46.7	46.1 35.7 40.9	42.6 32.8 37.7	52.3 38.7 45.5
West Linton	39.7 28.8 34.2	41.0 29.8 35.4	45.7 32.2 38.9	50.5 35.1 42.8	56.8 39.2 48.0	62.2 44.6 53.4	64.4 48.4 56.4	63.5 47.7 55.6	59.2 44.2 51.7	52.3 39.7 46.0	45.9 34.5 40.2	42.1 31.8 36.9	51.9 38.0 44.9
Elkdalemuir	38.8 30.4 34.6	40.5 30.6 35.5	45.4 32.4 38.9	50.8 35.1 42.9	57.5 39.3 48.5	62.1 44.9 53.5	64.0 48.6 56.3	63.4 48.0 55.7	58.9 44.9 51.9	52.2 40.3 46.2	45.6 35.9 40.7	41.1 33.4 37.2	51.7 38.7 45.2

Table S. XLII
Average Daily Range of Temperatures (1931-40)

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
	Altitude												
Sourhope	30.5	9.9	12.2	13.9	17.3	18.0	17.1	15.4	13.8	12.0	9.9	9.9	13.3
Selkirk (Browhill)	10.0	11.3	13.7	15.9	17.8	16.3	15.7	14.6	13.5	11.6	10.1	9.5	13.3
Hawick (Wanshope)	11.3	12.3	15.8	16.4	17.8	17.3	16.5	15.2	14.3	12.6	10.4	10.4	14.1
Kelso	11.0	12.0	14.2	15.9	17.1	17.1	16.4	15.7	15.8	14.3	12.2	10.7	14.6
West Linton	10.9	11.2	13.5	15.4	17.6	17.6	16.0	15.8	15.0	14.6	11.4	10.3	13.9
Marchmont House	9.9	10.8	12.8	14.6	16.0	16.4	15.4	15.1	14.2	12.3	10.8	9.5	13.1
Broughton (Searhope Farm)	10.3	10.8	13.1	16.0	18.0	17.5	16.0	15.6	14.5	11.8	10.4	9.8	13.6
Blay's Bridge	9.5	10.2	12.2	14.4	16.5	16.1	14.8	14.9	13.3	11.1	9.7	9.4	12.7
Elkdalemuir	8.4	9.9	13.0	15.9	18.0	17.2	15.4	15.3	14.0	11.9	9.7	7.7	13.0

Table S. XLII

Hours of Bright Sunshine—Averages for the Period 1931-40

	<i>Marchmont House</i>		<i>Eskdalemuir</i>	
	Total	Daily Mean	Total	Daily Mean
Jan.	44	1.42	44	1.41
Feb.	61	2.16	65	2.32
Mar.	97	3.13	95	3.05
Apr.	142	4.74	130	4.34
May	172	5.55	174	5.61
June	180	6.00	169	5.63
July	155	5.00	140	4.51
Aug.	142	4.58	129	4.17
Sept.	117	3.91	100	3.34
Oct.	76	2.45	78	2.52
Nov.	47	1.57	50	1.66
Dec.	36	1.16	36	1.15
Year	1,269	3.48	1,210	3.31

Table S. XLIII
Average Monthly and Annual Rainfall for the Period 1916-30

Station	Altitude	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Tulla Linnis Foot	968'	7.39	4.53	4.03	3.71	3.69	3.64	4.80	5.17	5.01	6.62	6.09	6.64	61.04
West Linton	888'	1.96	2.72	2.52	2.44	2.80	2.48	3.71	3.91	3.66	4.02	3.66	3.51	29.39
Peelien	823'	2.45	2.45	2.10	2.10	2.34	2.03	2.93	3.14	2.93	3.47	3.14	3.07	33.51
Seikirk (Boswell)	600'	5.70	2.87	2.23	2.19	2.43	2.16	2.92	3.26	2.85	3.64	3.29	3.26	34.30
Hawick	514'	3.38	2.26	2.13	2.00	2.29	2.20	2.88	3.27	2.81	3.37	2.91	2.85	32.55
Kelso	195'	2.28	1.70	1.61	1.57	1.64	1.92	2.79	3.00	2.29	2.66	2.32	1.67	25.95
Enrick	745'	6.78	4.61	3.67	3.67	3.96	3.72	4.79	5.33	5.04	6.15	5.75	5.82	59.24
Jedburgh	270'	2.38	1.69	1.75	1.59	1.84	1.88	2.69	3.22	2.30	2.75	2.35	2.19	26.73
Eskdalemuir	794'	7.56	4.60	3.96	3.80	3.78	3.97	5.00	5.90	5.33	6.54	5.97	6.26	62.27
Irvine House	200'	5.45	3.37	2.96	2.96	2.99	3.45	4.49	5.12	4.63	5.13	4.43	4.58	49.56

Table S. XLIV

Average Number of Days p.a. of Snow Lying at 0900 hrs. G.M.T. at Depths Specified

	Alt.	1"	2"	3-4"	5-6"	7-8"	9-12"	13-16"	Over 16"	Total
<i>Over 7-year period 1957-63</i>										
Selkirk (Bowhill)	600'	10.3	3.6	6.0	4.8	2.1	1.7	1.6	2.5	32.6
Broughton (Starhope)	741'	15.7	6.0	7.8	0.8	0.0	0.0	0.0	0.0	30.3
Blyth Bridge	830'	13.7	5.6	8.3	3.0	2.0	0.1	0.0	0.0	32.7
<i>Over 10-year period 1954-63</i>										
Starhope	900'	16.2	3.1	5.3	3.5	2.3	1.8	1.3	6.2	39.7
<i>Over 17-year period 1947-63</i>										
West Linton	800'	16.1	4.9	5.3	4.0	4.3	1.1	0.3	0.9	36.9
Eskdalemuir	794'	11.6	5.9	8.4	2.6	1.8	2.1	2.2	0.3	34.9



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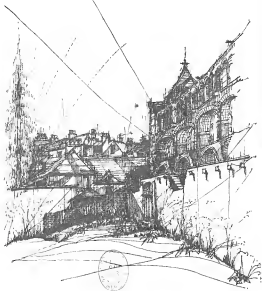
The Central Borders

VOLUME TWO: ECONOMIC AND GEOGRAPHICAL REPORT

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1968



The Central Borders

VOLUME TWO: ECONOMIC AND GEOGRAPHICAL REPORT ON THE PLAN FOR EXPANSION

Study Director: J. N. WOLFE, Professor of Economics, University of Edinburgh
Editors: J. N. WOLFE and W. D. C. WAGGIE, Department of Economics, University
of Edinburgh

This volume is the second of two prepared for

THE SCOTTISH DEVELOPMENT DEPARTMENT

by the Consultants in the University of Edinburgh

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This report was prepared by a team at the University of Edinburgh at the request of the Scottish Development Department. Our remit called for us to help devise a method of implementing the proposals of the White Paper.¹ These proposals involved the introduction of an additional 25,000 persons into the Central Borders over the next ten to fifteen years.

A large part of the work of the team involved close liaison with the physical planning group directed by Professor P. Johnson Marshall. Much of this work has found its place in the assumptions underlying the details of land assignment in the physical plan.² This will be the fate of much economic work of this sort in the future, and is to be welcomed as a sign of the increasing incorporation of economic techniques in the process of physical planning.

The work reported on here has essentially been a team effort.

The team involved consisted of the following:

Professor J. N. Wolfe (Director)
Professor P. Vandome
Professor J. Wreford Watson
Professor A. J. Youngson
Mr. A. Dagnone
Mr. C. Ekstrand
Mr. D. Fenn
Mr. N. Gillespie
Mrs. Hood
Dr. J. Morth

Mr. A. Scott
Dr. L. C. Wright
Mr. W. D. C. Wright
Mr. R. Young

Nevertheless Professor J. N. Wolfe was the principal author of Chapter 1 and 9; Dr. J. Morth Chapter 2 and Appendix to Chapter 7; Messrs. W. D. C. Wright and N. Gillespie Chapter 3 and together with Professor Wolfe Chapter 6; Mr. R. Young Chapter 4; Dr. L. C. Wright Chapter 5 and Appendix to Chapter 3; Mr. D. Fenn Chapter 7; Professor J. Wreford Watson Chapter 8.

Dr. Lionel Needlesman read the whole document and offered many helpful suggestions.

Mr. W. R. Cairns helped with the editorial work. Mrs. Hood was responsible for drawing up the maps and charts.

A special word should be said about the role of Professor Wreford Watson, who as Dean of the Faculty of Social Sciences had an important role in co-ordinating the work of the economists and the physical planners. The success of these studies owes a great deal to his unflinching tact, charm, and intelligence.

¹The Scottish Economy 1962 to 1970. *A plan for Expansion*. January 1966. Cmd 2894.

²The figures mentioned in this report have been revised since they were submitted to the Physical Planning Group. Their only function is to serve as a guide to the relative importance of the various land uses in the Physical Plan and the land in the report.